SACKETT DEPENDABLE CARS

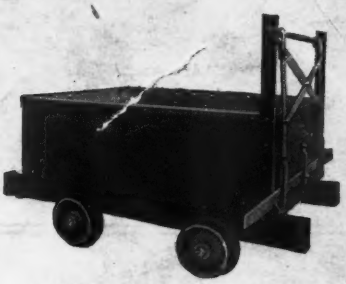
FOR QUARRY AND PIT SERVICE

No. 450 Rocker Race Dump Car

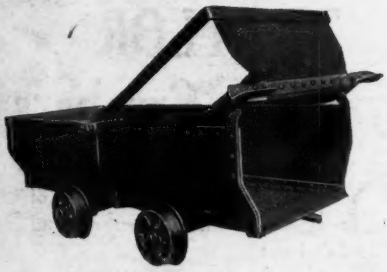
Economically designed and built for Strength, Utility and Rough Usuage.

Several types. Side and end dump.

Suitable Capacities, Roller Bearing or Self-Oiling Wheels.



No. 430 End Dump Quarry Car



No 431. Bent Side End Dump Car

Also supply industrial track switches, turntables, 12 lb. to 30 lb. rail, with steel ties, bars, bolts and clips.

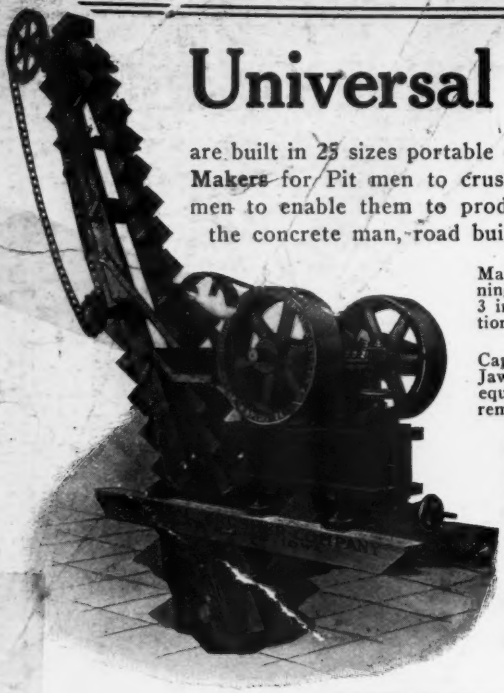
We manufacture Hand and Power Revolving Screens, Chutes, Skips, and other Quarry Equipment.
Write for catalogue and prices.

H. B. Sackett Screen & Chute Company

Office and Factory: 1682 Elston Avenue - CHICA

Universal Crushers

are built in 25 sizes portable or stationary, and are **Money Makers** for Pit men to crush their oversize and Quarry men to enable them to produce small crushed stone for the concrete man, road builder and contractor.



Machines can be adjusted while running, to produce material varying from 3 in. to as fine as ¼ in. in one operation.

Capacities from 5 to 300 tons per day. Jaw openings 5x6 to 14x24 inches equipped with manganese jaws and removable bronze bearings.

Send for Catalogue of full line of Universal and Eureka crushers, rolls for fine grinding, Elevators and screens of all sizes, also full line of Universal Pulverizers for the manufacturing of Agricultural Limestone and the grinding of other fine materials.

UNIVERSAL CRUSHER CO.
200 Third Street, Cedar Rapids
Iowa, U. S. A.

TRAYLOR
Gyratory Crushers

with their extra large shafts—eccentric both longer than others and of greater diameter, entirely submerged in the lubricant

ASSURES YOU

of a cool running Crusher, having the maximum capacity with the cost of upkeep reduced to the minimum.

Bulletin QG-4—It's New
Get It.

Traylor Engineering & Manufacturing Co.
Main Office and Works:
Allentown, Pa., U. S. A.

Chicago Office:
1414 Fisher Building

The Largest Agricultural Limestone Producers

USE

The Bradley Three Roll Mill

This mill is in use by more large producers than any other machine made—produces more material and at a lower cost.

No auxiliary machinery or screens needed to procure the very finest finished product—takes rock ¾" in diameter and reduces to shipping fineness in single operation.

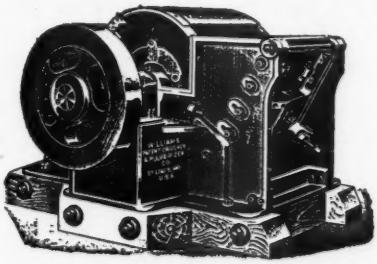
The Demand for Finely Ground Limestone Is Increasing. Why Not Prepare Now?

Send for Catalog No. 42—Our Engineering Dept. Is at Your Service

Bradley Pulverizer Co.

BOSTON **London** **Works—ALLENTOWN, PA.**

FROM 14" TO 18" CUBES TO 1½"- 1"- ¾"- ½" IN ONE OPERATION



BY using Williams Jumbo Crushers to take the feed from the very large Gyratory Crushers, the smaller or intermediate crushers, which were formerly necessary, can be eliminated as the Williams Jumbo Crusher will reduce these large cubes ranging in size from 14" to 18" to a product either 1½"-1"-¾" or ½". Capacities from 60 tons per hour to 200 and 300 tons per hour. Complete description of this extraordinary crusher is given in

BULLETIN NO. 85

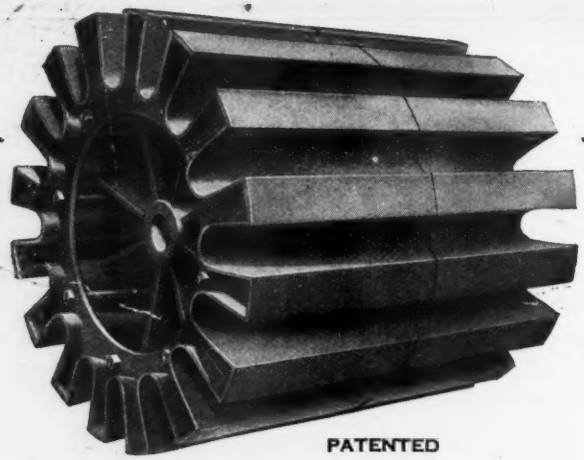
THE WILLIAMS PAT. CRUSHER & PULVERIZER CO.

Gen'l Sales Dept., Old Colony Bldg.,

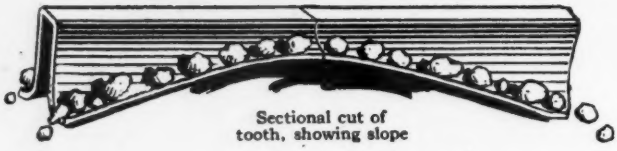
CHICAGO

Plant: St. Louis, Mo.

7 Second St., San Francisco, Cal. First National Bank Bldg., Denver, C



PATENTED



Sectional cut of
tooth, showing slope

This Device Is That Little Ounce of Prevention That Saves Many A Pound of Cure!

Where the ordinary pulley is used, elevator belts wear out rapidly, due to the cutting and bruising action of stones which get between the belt and the boot pulley. The result is much expense and loss of time caused by shut-downs due to the replacing of elevator belts in crushing plants.

The "BLACK" Boot-Pulley For Elevator Belts

solves this problem as it is constructed with longitudinal sloping grooves so that

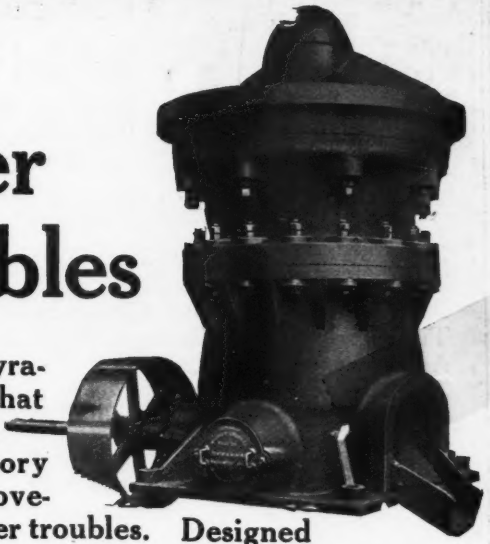
No Stones or Hard Objects Can Damage Belting

The sloping construction of the grooves results in the immediate ejection of any hard material falling between the belt and pulley.
Let us send you descriptive circular.

Other Products We Manufacture for Crushing Plants

[illegible]-Chalmers Manufacturing Company
MILWAUKEE, WIS.

Avoid Crusher Troubles



The Superior-McCully Gyratory Crusher has features that you will find in no other standard type of gyratory crusher. Its new improvements will end your crusher troubles. Designed to overcome the faults usually found in gyratories, this machine from the start has enjoyed a remarkable success. Over 100 now in use.

THE NEW SUPERIOR - McCULLY GYRATORY CRUSHER

(Patented)

Life of "Eccentric and Gears" are lengthened 200% because all dust and grit are absolutely excluded and Cut Gears run quietly in oil.

Main Shaft is 60% stronger than Standard Gyratories of corresponding opening. Area of eccentric 100% greater than any other machine of equal size. Capacities—30 to 1000 tons per hour, built in sizes from 10" to 54" opening.

Recent orders received for Superior McCully Gyratory Crushers from prominent Lime and Cement Manufacturers.

Lehigh Portland Cement Company,
International Portland Cement Co.,
Cuban Portland Cement Co.,
Standard Lime and Stone Co.,
Rock Cut Stone Co.,
Lehigh Stone Co.

Let us tell you how we overcome common crusher troubles.

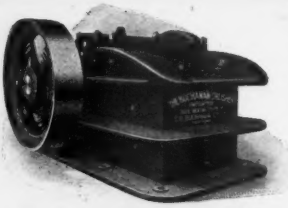
Ask for Bulletin

WORTHINGTON PUMP AND MACHINERY CORPORATION

New York Office, 115 Broadway. Power and Mining Machinery Works, Cudahy, Wis.

Chicago Office, 820 Old Colony Building

Branch Offices in All Principal Cities

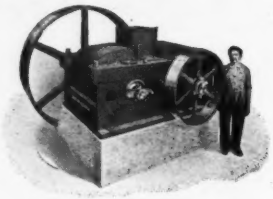


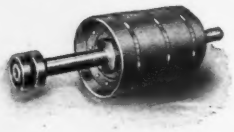
Buchanan All-Steel Crushers

Type B—12 sizes, from 5x12″ to 24x36″. Manganese Steel wearing parts, Water Jacketed Bearings, Parting Pitman in larger sizes, adjustable jaw stroke. Type C—24 sizes, 24x36″ to 60x84″.

Buchanan Crushing Rolls

Type C—sizes from 18x12″ to 42x16″. Type C Special from 42x18″ to 72x24″. Phosphor Bronze Bearings, Chrome Steel Tires, Patent Swivel Bearings, Fleeting Adjustment, Dust Covers.



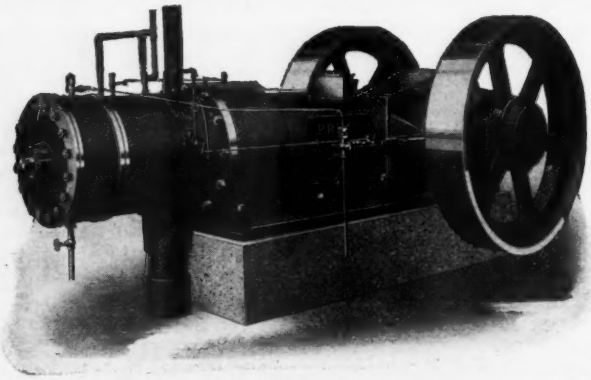


Buchanan Magnetic Separators and Magnetic Pulleys

Protect your machinery against breakage from tramp iron and steel.

C. G. BUCHANAN CO., Inc., 90 West St., New York, U.S.A.

Operates on the Cheapest and Most Plentiful Fuel



INSTALL "PRIMM" OIL ENGINES

It is not necessary to tell you the ***PRIMM*** engine is powerful and durable. ook at them. The appearance tells the story. They are second to none in omy, dependability, ease of operation and starting.

A Size and Type for Every Need Illustrated in Our Catalog

WER MFG. CO., Dept. No. 3 **MARION, OHIO**

Visit Our Big Modern Plant

Sterling MOTOR TRUCKS

Deliver on Time --Shorten Long Hauls

FOR hauling units and fleets Sterling dump trucks are designed and constructed to meet all hauling requirements of contractors. Have strength without weight and capacity without burden.

---With the Wood-Inlaid Frame

Shocks are life destroyers—maintenance and inspection expense creators—but 11 years have proved that the Sterling oak-inlaid frame means long life to the motor and power plant—minimum idle hours or days for repairing—the most satisfactory constant availability—always on the job, for service.

Built in 2½, 3½, 5 and 7-ton capacities—bodies for any specifications.

Our well equippe1 distributors and service stations in leading cities properly represent factory standards and established service policy.

Write for Hauling Facts

STERLING MOTOR TRUCK COMPANY

Builders of Motor Trucks Exclusively for 11 Years

MILWAUKEE, WISCONSIN

THE LOVELACE LUMBER CO.

tried the Gramm-Bernstein truck out thoroughly under the worst conditions it could have to work under.

It met the requirements perfectly as it is meeting all sorts of working conditions for thousands of owners in over a hundred lines.

The Gramm-Bernstein Motor Truck Company

LIMA, OHIO

LOVELACE LUMBER COMPANY

MANUFACTURERS OF

LONG LEAF YELLOW PINE

LUMBER AND TIMBER

BREWTON, ALA.

January 31st, 1918.

THE GRAMM-BERNSTEIN MOTOR TRUCK COMPANY,
Lima, Ohio.

"Grading rules of Southern Pine Association apply, unless otherwise specified."

Gentlemen:

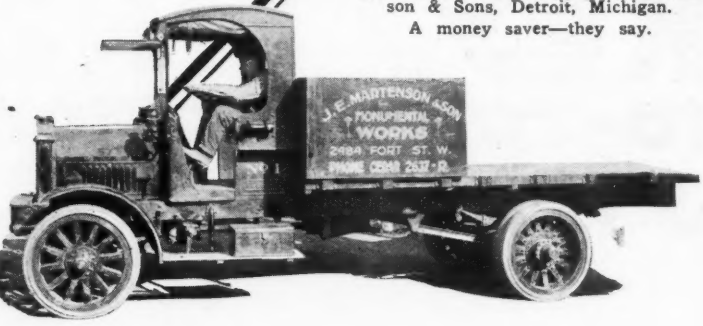
We have just purchased of Mr. A. A. Williams a three-and-one-half ton capacity GRAMM-BERNSTEIN Truck.

This was purchased after careful comparison and thoroughly trying out under the most unfavorable weather and road conditions.

Yours very truly,

Lovelace Lumber Company

By W. P. Lovelace
President



3½-Ton Federal used by J. E. Mortenson & Sons, Detroit, Michigan.
A money saver—they say.

Heavy Hauling Emphasizes Federal Quality

THIS quality being a combination of rugged strength, extreme durability—and great economy.

Federals have proved just as ideal for the difficult tasks as for the quick, light hauling. There is a Federal that is best suited to your work—that will do your work most satisfactory and at the lowest cost.

Write for the magazine "Traffic News," a monthly magazine for truck owners and buyers.

Federal Motor Truck Company

44 Federal Street

DETROIT MICHIGAN

FEDERAL

One to Seven Tons Capacity

KEYSTONE 10-TON TRACTION STEAM SHOVEL

HERE IS A LIGHT TRACTION STEAM SHOVEL that will go anywhere you could take a loaded dump wagon. A 15-mile jaunt in ten hours, over decent roads, is easy for it.

IF YOU HAVE A STRIPPING JOB, or if you wish to accurately separate two strata of clay or sand, the flat bottom half-yard SKIMMER SCOOP will do your work as nothing else could.

IN SHALLOW CUTTING, 6 in. to 2 ft., this little shovel will beat the big ones in daily output. Its 16-ft. boom and 11-ft. horizontal crowding movement give it the bulge on shallow work.

And it will DRIVE ITS SCOOP INTO THE TOUGHEST FIRE-CLAY, gravel, shale or anything, in fact, but solid rock.

There are dozens of KEYSTONE excavators DIGGING BITUMINOUS COAL, in open pits.

You can LOAD FROM STORAGE PILES of crushed stone, sand, gravel or coal, into freight cars, industrial cars or wagons.

And you can get around quickly from your quarry to your storage dump and vice versa.

AGAINST A HIGH BANK of sand or clay, where all strata are to be mixed in digging, you would, of course, use the DIPPER SCOOP, which works like the ordinary type of steam shovel.

When necessary to cut below grade, as in working around the top of your quarry face, you should use the DRAW DITCHER SCOOP, which is a positively controlled dragline attachment, cutting toward the machine and to a depth of 16 feet below grade.

The machine can be thus equipped WITH THREE DIFFERENT SCOOPS AND ATTACHMENTS: The Skimmer, Dipper and Ditcher. They are inexpensive and you can change from one to another in a few minutes. The cost is low.

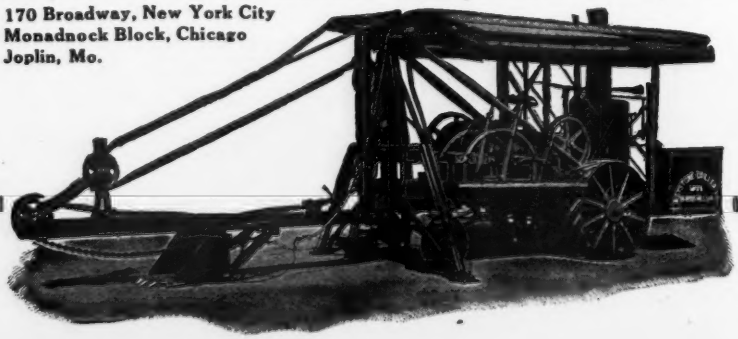
It will give you confidence to know that, while the Keystone Shovel is comparatively a newcomer, there are already over 400 of them in use among contractors and quarrymen, and they have won enthusiastic approval.

Besides, the machine is sponsored by the Keystone Driller Co., which is by no means a newcomer in the manufacturing field, having been in business at Beaver Falls, Pa., since 1882.

The photographs reproduced in OUR SHOVEL CATALOG show the machine on dozens of different jobs and they will show you more in a minute than we could tell you in an hour. They are supplemented by many pages of cuts reproduced from drawings prepared by our Engineers. The accompanying text is fully descriptive and contains such data as you will require to determine what could be expected of the Keystone Excavator on your work. Drop us a line NOW.

KEYSTONE DRILLER CO., Beaver Falls, Pa.

170 Broadway, New York City
Monadnock Block, Chicago
Joplin, Mo.



Because—

DYNAMITE

Will Do Your Work Right

is the reason you should use it. We have a variety of grades—they will suit your particular needs, no matter in what manner they are connected with blasting.

Many users have individual blasting problems to solve. To such, we offer our consultation services, and we will also make an exhaustive study of your requirements, gratis. Then our recommendation of proper grades is at your disposal—whether you take advantage of it or not.

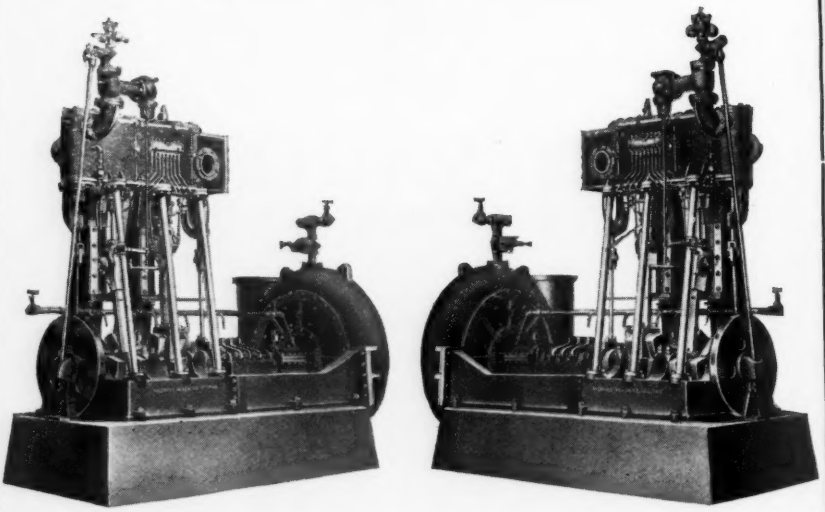
Could you ask for more?

ÆTNA EXPLOSIVES COMPANY

Incorporated

120 Broadway New York City

MORRIS PUMPS



15" Dredging Pumps with 200 HP Compound Engines

The U. S. Engineers have several dredges equipped with this pump

You can buy a centrifugal pump of any Size, any Type, any Drive from *Morris*

MORRIS MACHINE WORKS

BALDWINSVILLE, N. Y.

Branches in principle cities.

Pit and Quarry

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime
Member Audit Bureau of Circulations

VOL. 3 CHICAGO, ILL., OCTOBER, 1918 NO. 1

CONTENTS

Interesting Massachusetts Plant 19
The Trade Acceptance 21
Bridging the Great Desert 25
Editorial Comment 26
A Typical Illinois Quarry 29
Big Loads at Little Cost 33
Sand-Lime Brick 34
Making Marble Into Lime 37
Association Activities 41
Men and Machinery 44

Index to Advertisers

Ætna Explosives Co., Inc..... 15
Allis-Chalmers Mfg. Co..... 8
Atlas Powder Co..... 35
Austin Mfg. Co..... 30

Ball-Engine Co..... 18
Bell Locomotive Works..... 29
Bradley Pulverizer Co..... 7
Burch Plow Works Co..... 4
Burnham, Royal E..... 29
Buchanan, C. G., Co., Inc..... 10

Caldwell & Son Co., H. W..... 19
Chalmers & Williams..... 2
Chicago Perforating Co..... 29
Continental Car Co. of America.... 4
Curtiss Willis Co..... 27

Du Pont de Nemours & Co., E. I.. 37
Duplex Truck Co. 00

Erie Pump & Engine Works..... 32
Erie Steam Shovel Co..... 18

Fate Co., J. D..... 33
Federal Motor Truck Co..... 13

Gramm-Bernstein Motor Truck Co. 12
Grasselli Powder Co..... 3
Gregory Electric Co..... 26

Haiss Mfg. Co., Geo..... 23
Hendrick Mfg. Co..... 31
Hercules Powder Co..... 36

Kennedy-Van Saun Mfg. & Eng. Corp. 18
Keystone Driller Co. 14
Kleinhans Co. 24

Lewistown Foundry & Mach. Co... 21

Machinery Warehouse & Sales Co. 25
Mansfield Engineering Co..... 30
Michigan Dredge Co..... 34
Morris Machine Works..... 16
Mundy Hoisting Engine Co..... .....Front cover

National Surface Guard Co..... 26

Osgood Co..... 34
Orenstein-Arthur-Koppel Co..... 27

Power Manufacturing Co..... 10

Ross Power Equip. Co..... 27

Sackett Screen & Chute Co..... 5
Sauerman Bros. 30
Schaeffer Engineering & Equip. Co. 23
Sterling Motor Truck Co..... 11
Superior Iron Works..... 32

Traylor Engineering & Mfg. Co... 6

Union Chain & Mfg. Co..... 29
United States Rubber Co..... 28
Universal Crusher Co..... 6

Victor-Balata & Textile Belting Co. 31

Williams Patent Crusher & Pulv. Co. 7
Worthington Pump & Mchy. Co... 9
Zelnicker 27

PIT AND QUARRY is published at 875 Rand-McNally Building, Chicago, Ill. Subscription price, $1.50 per year.
Contributors and advertisers should have copy in the office by the 15th of month preceding publication, as forms close at that time.

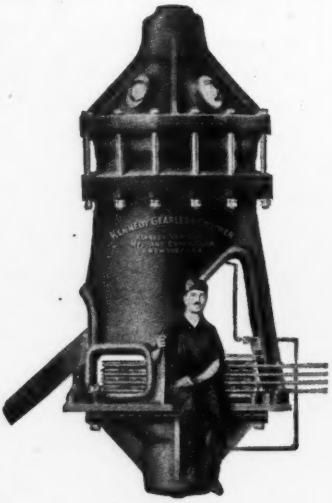
The Machine that meets the demand of years is here

The KENNEDY GEARLESS CRUSHER

ONE Crusher of this type has a capacity, when crushing to ¾ inch and finer, of approximately SIX No. 3 Gyratory Crushers, giving an enormous output of fine product.

It is a strong, rigid machine, made throughout of best materials. Is driven by one belt or rope sheave. Power required is little for the tonnage produced. Crushing parts are entirely enclosed, making machine practically dustless.

These are only a few of the advantages of this remarkable Crusher.



We have the largest line of Mining, Crushing and Cement Machinery of any concern in the world. Send us your inquiries.

Ask for Catalogue No. 24.

Kennedy-Van Saun Mfg. & Eng. Corp.

Equitable Building **New York City**

ERIE Revolving Shovels

BALL Engine Co. Erie, Pa.

"With one ERIE Shovel and 18 or 19 men, we are now getting the same output which formerly required 40 to 50 men.

"Besides this big saving in our pay-roll, we now have the assurance of a steady output, every day.

"After using two ERIE Shovels in hard quarry service, we can conscientiously recommend the ERIE."

L. Suzio, Pres't
YORK HILL TRAP ROCK QUARRY CO., Meriden, Conn.

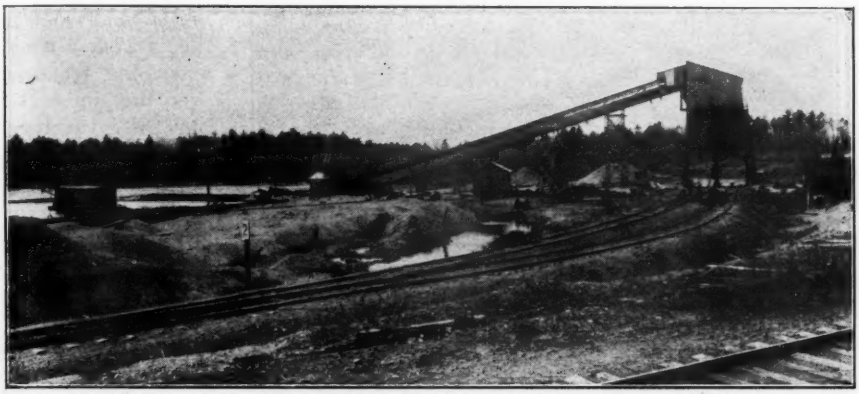
"Replacing 20 to 30 men; Sure of rock every day!"

Even in a quarry which employs only 15 to 20 men, a good steam shovel will usually save money. It's worth your while to figure this carefully. We will be glad to send you our latest Bulletin on steam-shovel work—write for a copy of Bulletin "Q." Address

BALL ENGINE CO., ERIE, PA.
Builders of ERIE Steam Shovels and Cranes; BALL Engines.

Pit and Quarry

Vol. 3 Chicago, Ill., October, 1918 No. 1



New Plant of the New England Sand and Gravel Company

Interesting Massachusetts Plant

Operations of the New England Sand and Gravel Company Include Some Unusual Features.

SOME details of more than usual interest are embodied in the operations of the New England Sand and Gravel Company, West Peabody, Mass., both as now conducted and as they were handled before the completion of the new plant shown in the photograph reproduced above.

The material is obtained by means of a hydraulic dredge which was erected and equipped by the Morris Machine Works of Baldwinsville, N. Y. This is shown at the extreme left of the picture. The pumping unit consists of a 250-hp. Allis-Chalmers motor direct-connected with a 12-in. Morris pump. The property of the company was at one time a quarry, and the hole left by the quarrying operations is now utilized as a pond, water being obtained from a brook flowing from a nearby lake. The water after it has been separated from the material is conducted back to this pond.

Connected to the dredge is a pipe line which carries the material to the screen and wash house situated on the edge of the pond. This pipe line is of 12-in. wrought iron pipe, and is about 500 ft. long. The illustration on the following page affords an excellent view of the dredge-boat as well as of the pond and of the pipe line. Formerly another 12-in. heavy duty Morris pump at the base of the screening tower received the material from the dredging pump aboard the dredge and boosted it to the top, a vertical height of nearly 100 feet.

DREDGE BOAT IN OPERATION.

The discharge line shown in this view carries the material to the wash-house, whence it is conveyed by Balata belts to the screening tower.

The buildings are now connected by means of two 18-in. belts of Balata, one belt being used for stone and the other for sand.

The screen house now contains the machinery for washing and crushing and also the sand-separating apparatus, and the present head is 20 ft., the recent alterations enabling the company to dispense with the second or booster pump with which they first operated.

The storage building is removed from the wash-house about 240 feet, and over the top of the bins are arranged the sizing screens for stone as well as for sand. The shipment of material is made from this building by side and under-bin delivery.

The power used throughout is electricity from a high-voltage system, reduced to 2,200 volts for the dredge and 220 volts for other motors operating the conveyor, elevator, crusher, screens, etc.

The officers of the New England Stone and Gravel Company are: Walter Scholes, president; P. M. Wagner, vice-president and treasurer; S. R. MacNeal, secretary. Mr. MacNeal reports that the results obtained by the dredging method have been very satisfactory and that the company looks forward to a very good season.

A COUNTRY worth fighting for is a country worth saving for. Buy Thrift Stamps.

The Trade Acceptance

By ALBERT MOYER,
Manager of Sales, Vulcanite Portland
Cement Company

IN ORDER to keep the transports moving, and the wheels of production, commerce and industry turning, every dollar's worth of credit must be whipped into such shape as will enable it to render the maximum of service. This is the demand of the nation. Hundreds of millions of dollars represented in open book accounts can be made available for greater service through the use of the Trade Acceptance. It is the duty of every banker, manufacturer, wholesaler, jobber and merchant to assist in the transformation of these accounts. That it is to his profit also is shown in the succinct and logical article which follows. It is the substance of an address delivered before a recent convention of the Long Island Coal and Building Material Dealers' Association by Mr. Moyer.—EDITOR.

THE trade acceptance is defined by the Federal Reserve Board as a draft or bill of exchange, drawn by the seller on the purchaser. These trade acceptances must have a maturity of ninety days exclusive of the days of grace, except that, if drawn for agricultural purposes or against the sale of live stock, it may have a maturity at time of discount of not more than six months exclusive of the days of grace. Trade acceptances should have nothing to do with nor be employed in any class of transaction except that concerning the purchase and sale of goods and should represent only current transactions.

Please observe that a trade acceptance is not a sight draft or a promissory note. As one authority has explained, a note is drawn by a person, whereas a trade acceptance is drawn on a person. A note is generally used in borrowing money and in the settlement of past due obligations, while a trade acceptance bears on its face evidence that it is drawn by the seller of merchandise on the purchaser for the purchase price of goods sold. When accepted, it constitutes a valid promise to pay on a specified date, and as a negotiable instrument it is as binding upon the acceptor as his promissory note, but it performs a different function.

We have all along been familiar with the complaint of the retail merchant that he is compelled to sell on credit and that the thirty days or other term of credit which he grants is usually strung out to ninety days or a longer period; that this carelessness about paying up leads to collection costs, litigation and bad debts, to say nothing of the interest on the money tied up and the inability to use such money in expanding business. The substitution of trade acceptances or liquid commercial paper for open book accounts helps the credit position of the country materially by increasing the credit to that extent. The trade acceptance system would practically eliminate overdue accounts, which, according to records obtained from jobbers and dealers, amount to about 30 per cent of the sales, and if legal proceedings are necessary a trade acceptance is much better than an open book account, because the seller has acknowledgment in writing of the correctness of the account.

All of the conveniences of the open book account can be retained; for instance, the right to make partial payments, which can be arranged for with the bank. If the customer is not able

to meet the trade acceptance when it comes due, and if the dealer wishes to help him out, he can do so by having the customer sign a promissory note with interest, and in this manner the purchaser grants his customer the favor of an extension, but without the loss of interest that accrues under the old system. Trade acceptances are never good for renewal of an old account. These should always be settled with notes drawing interest.

Open book accounts cause the dealers to act as bankers in supplying credit to their customers. This fact is seldom realized by the dealer in making price for goods to be sold to the trade. The use of trade acceptances passes the banking business of the dealers over to the bankers, where it belongs. The use of trade acceptances makes it unnecessary for the dealer to borrow money.

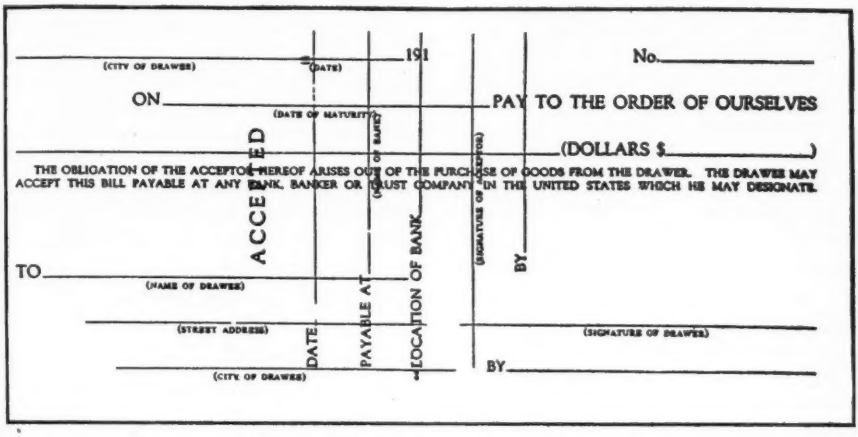
If you will study this subject, you will undoubtedly realize that all this trouble can be largely abolished by the adoption of this method of collection. This system would curtail or end the taking of unearned or unauthorized discounts, would curb the unfair practice of returning merchandise after shipment or delivery has been made, would tend to stop the pernicious practice of assigning or hypothecating open book accounts to secure working capital, and would operate to reduce the overhead cost of doing business.

There have been some objections raised as to the adoption of the trade acceptance as a means of collecting for goods purchased. One of the objections raised is, where purchases are made daily or frequently in small amounts the number of trade acceptances would necessarily be very great. The answer to this is, that it is assumed that where purchases are made several times weekly in small amounts, they will be combined into one semi-monthly or monthly statement, which will be settled by giving one trade acceptance semi-monthly or monthly.

Another objection to the trade acceptance is that the trade looks on it as a demand note. When asked to give a trade acceptance, the customer often answers that he has never given a note in his life and he doesn't intend to. If you will inform your customers, both verbally and by letter, explaining what a trade acceptance really is, how it will be of benefit to the country and of benefit to your customers in increasing their credit in the community, they will soon understand that this is not a note they are giving, and as far as affecting their credit adversely is concerned, the trade acceptance is the reverse of a demand note. Mercantile agencies usually base their estimate of a man's worth and character upon the manner in which he meets his own financial obligations. The trade acceptance is self-evidence of prompt payment. Those who settle by this method put themselves in the class of preferred buyers, the same as those who discount for cash. This fact is recognized by the commercial agencies in their ratings, and the inevitable result will be that those who demand long credit only on the basis of open book accounts will have to pay higher prices than those who discount or use trade acceptances. Those who pay bills promptly, taking the cash discount premium, are not expected to use trade acceptances. A trade acceptance is merely to take the place of the open book account.

The method of procedure in putting this system to practical use is as follows: Your customer buys a bill of goods, and if he cannot pay cash you request him to sign a trade acceptance, which may run for ninety days, or if for agricultural purposes, it will run for six months. You sign this paper also, take it to the bank and get cash for it, subject to the prevailing rate

of discount, which rate of discount is one-half of one per cent lower than for a promissory note, due to the fact that the bank can take this paper and rediscount it at a lower rate of interest in a Federal Reserve bank. Your customer now has the goods, your banker has the trade acceptance, and you have your money. You have no more trouble with the transaction unless your customer fails to pay the trade acceptance at the specified time. The banker is the one that makes the collection. If your customer fails to pay, you are in less trouble than if you had had an open book account, for you have a positive acknowledgment of not only the receipt of the goods but the accuracy of the account and you can sue with little or no trouble; but your customer does not want to have his credit bad at the bank or in the community. He therefore will pay his trade acceptance promptly.



Approved Form of Trade Acceptance

This system gives the merchant increased working capital; the conversion of open book accounts into cash releases immediately the capital you have tied up in your books, which brought you no interest whatever. You can therefore either operate with less capital or do an increased business on the same capital. This means greater profits. If you operate with less capital you then have money available to invest in Liberty bonds, and in this respect trade acceptances will perform a patriotic service.

We assume that your customer does not want to accept this paper, but will reject it. You should keep a list of these acceptances as they go out, number them and record the amount of each and the name of the customer. If an acceptance does not come back within a reasonable length of time, say ten days, write the customer a letter, saying that you mailed the acceptance on such a day, and ask him to return it. If you do not get an answer, write him again. If you follow these proceedings every 10 or 15 days, the matter remains in your collection file, and is kept before you. None of your time is lost. You can go after it from a collection standpoint as well as educate your customer in his use of trade acceptances.

When you make up your invoices and statements every 10 days, semimonthly or monthly, as the case may be, attach to each invoice a trade ac-

ceptance properly filled out. Send your customer a letter calling his attention to the desire of the Treasury Department and the Federal Reserve Board to have the credit position of America in the most liquid possible shape as a basis for the successful financing of the war, and calling particular attention to the desirability of having this credit instrument called a trade acceptance take the place of the old-fashioned open book account. Advise him that the mercantile agencies give better credit ratings to those using trade acceptances, that the banks are heartily in favor of their use and urge their customers to use them; also by signing a trade acceptance he is relieving unnecessary strain on the country's financial resources. If, however, he wishes to take advantage of the cash discount you offer, he can send a check in payment of the account promptly. Also inform him that in accepting the trade acceptance, he is receiving an extension of credit without causing any loss to the bank or to you as a merchant, as the bank can rediscount this trade acceptance in the Federal Reserve bank. Inform him that the trade acceptance is evidence of prompt payment and is not looked on by the bank, mercantile agencies or others the same as a promissory note, they being absolutely the reverse of a promissory note as far as affecting credit is concerned. With this letter enclose an educational pamphlet describing the use of trade acceptances. These pamphlets can be obtained by applying to the American Trade Acceptance Council, 5 Nassau Street, New York.

In accepting a trade acceptance, your customer must designate either payment at his own office or at his bank.

With Liberty Loan drives, Red Cross drives, and other desirable and necessary campaigns, and the payment of the income tax and excess profit tax, there will be an enormous strain upon the banks of the country. We may expect credit to be curtailed, and if curtailed a line will certainly be drawn to differentiate strictly commercial from credit of an obscure character. The trade acceptance is a form of credit which should be subject to the least discrimination, so that its importance as well as advantage is obvious. Capital requirements are already straining the credit capacity of banks and manufacturers. There is no resort but the Federal Reserve System, no method of using its resources left but the trade acceptance. In an ever-tightening money market and ever-growing capital needs for money, the trade acceptance should be the universal system for all. Efficient business methods make it necessary and at the same time patriotism demands it.

Modern Management.

"Modern Management Applied to Construction" is the title of a handsome volume just published by the McGraw-Hill Book Company, New York, and written by Daniel J. Hauer, C. E., of the editorial staff of PIT AND QUARRY. (Large 8vo, 194 pages. Price, $2.50 net.) In this book Mr. Hauer, who has won deserved recognition in a wide field as a construction economist and consulting engineer, applies to contracting generally as well as to engineering and architectural construction the modern principles of efficiency which have achieved such convincing results in general manufacturing and distribution. Among the more striking practical topics in Mr. Hauer's thoroughly clear and practical treatise are those on the fundamental principles which should govern in the choice of type and amount of plant, on the application of motion and time studies, on cost-keeping and bookkeeping and on the effect of modern management upon workmen.

PIT AND QUARRY is read by us regularly. It gives much information of interest and value. I assure you that I appreciate its spirit of coöperation.—A. P. Burke, president Atlanta Sand and Supply Co., Atlanta, Ga.

Bridging the Great Desert

President Seiberling on the Bed of the Great Desert

AT LAST the Lincoln Highway is to be what its founders urged—"a continuous, connected improved highway from the Atlantic to the Pacific." The dream of those who have long advocated the improvement of the desert section of Utah is coming true. A real road in every sense of the word across the lower arm of the Great Salt Lake Desert is rapidly taking form, and Field Secretary H. C. Ostermann of the Lincoln Highway Association says that this greatest of all Lincoln Highway improvements will soon be completed.

Scene Where Dynamite Has Now Opened the Way for a Perfect Mountain Road

Pit and Quarry

Rand-McNally Bldg., Chicago, Ill.

Published Monthly

HARRY W. BAUMGARTNER
Publisher

V. E. LARSEN, Manager

F. J. SCHULTE, Editor

D. J. HAUER, Associate Editor

RICHARD K. MEADE, C. E.,
Contributing Editor

PHILIP H. HALE, Jr., Southwestern Representative
5710 Waterman Ave., St. Louis

H. W. BOOTH, Ohio Representative
552 Hippodrome Annex, Cleveland

War Service.

IT IS of utmost importance that every producer of stone, sand and gravel, lime, gypsum, etc., coöperate in every way with the War Service Committee on Mineral Aggregates. Giving information as to the availability of material in their respective districts whenever the members of the committee ask for it is, of course, imperative. The government demands this. Producers, however, should not content themselves with mere literal compliance with what the authorities lawfully require. The committee in its advisory capacity can do much to benefit the industries it represents, but its influence will depend entirely on the promptness and sincerity with which producers coöperate with its officers and members. The rock products industries are essential to the winning of the war. Therefore the interests of operators and of the government run parallel. The facts will prove this, but only their ready presentation will secure the greatest good for all concerned. On the promptness and coöperation of the producers themselves will ultimately depend the degree of preference accorded their industries.

More Machinery.

"PRODUCTION with less labor." That slogan, enforced by war conditions on every producing and manufacturing industry, applies particularly to those concerned with the products of the pit and the quarry. Its imperative force will increase with the passing months, for there is certainly no hope in the near future of improving labor conditions. Now is the time, therefore, before further price advances, to take inventory of equipment and arrange to supply inevitable needs. That more machinery will be needed, in view of the labor situation, is evidenced from the following facts as stated by a conservative estimator of existing conditions:

The manufacture of at least 75 per cent of the normal output of Portland cement has been authorized. The War Industries Board has decided that this amount is absolutely required for necessary government work. The immense government housing program will require also a very nearly normal production of gypsum, wall plaster, wallboard, roof slabs, etc.

Agricultural lime and pulverized limestone are on the war essentials list. The Department of Agriculture has declared them to be as important as any other war necessity. Millions of tons of limestone will be used for this and also for chemical purposes. The blast-furnace flux requirements alone amount to 25,000,000 tons a year, valued at $20,000,000. Crushed

stone, sand and gravel will be required in vast quantities for Government fortifications, warehouses, harbor structures, etc.

Besides all this, the government will soon begin to use increasingly large quantities of material for ballasting the railroads it has taken over. Director-General McAdoo's next step, after disentangling the railroad systems of the country, will undoubtedly be to put the roadbeds in the shape they should have been in before he took control. Signs are also increasing daily that the importance of the country's highways will soon be recognized. That will be the next great move in American war-preparedness. Only the confirmed pessimist should be able to see in the signs of the times any cause for delay or hesitation.

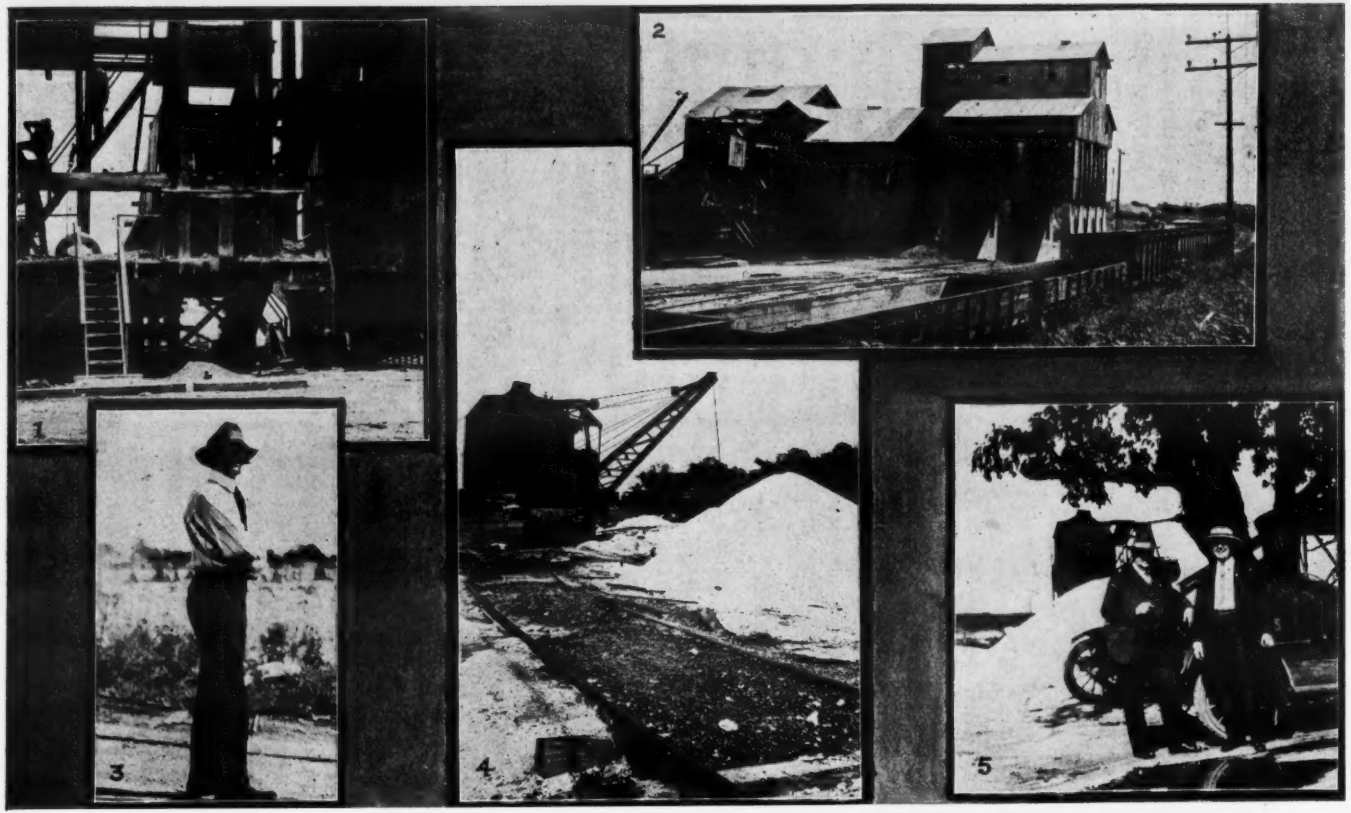
Roads and Railroads.

JUST as the main arteries of the human body cannot function properly when the lesser arteries, veins and capillaries are obstructed or otherwise disabled, so the railroads of this country will never be able to attain their maximum efficiency until the roads and highways are first made sound and usable. The formation of the United States Highways Council was hailed at first as an indication of a change in the attitude of official Washington toward road construction in wartime. It has been found, however, that this body merely centralized the agencies imposing restrictions on improvements. What is needed is a Federal Highway Commission, not to hamper improvements but to advocate and speed up the rational and immediate development of highway transportation. Its personnel should be made up of men fully informed on the economics of land transport—men who believe in the military and commercial value of hard-surfaced roads — men who realize that good roads are essential for the nation's well-being in war as well as in peace. And at their head must be a McAdoo, a Hurley or a Schwab. President Wilson found these men. He surely can find, too, a man capable of coördinating and enlarging our efforts at highway building to meet the urgent demands of these crucial times.

The Liberty Loan.

By Woodrow Wilson
President of the United States

AGAIN the Government comes to the people of the country with the request that they lend their money, and lend it upon a more liberal scale than ever before, in order that the great war for the rights of America and the liberation of the world may be prosecuted with ever increasing vigor to a victorious conclusion. And it makes the appeal with the greatest confidence because it knows that every day it is becoming clearer and clearer to thinking men throughout the nation that the winning of the war is an essential investment. The money that is held back now will be of little use or value if the war is not won and the selfish masters of Germany are permitted to dictate what America may or may not do. Men in America, besides, have from the first until now dedicated both their lives and their fortunes to the vindication and maintenance of the great principles and objects for which our Government was set up. They will not fail now to show the world for what their wealth was intended.



PLANT OF THE NATIONAL STONE COMPANY, JOLIET, ILL.

1. Manway to head of big McCully Crusher and top of incline. 2. Crusher and Screening Plant with Storage Bins and Loading Track. 3. W. N. Carter, President. 4. The 15-Ton McMyler Crane. 5. M. S. Kincaid and J. A. Freed of the Grasselli Powder Co.

A Typical Illinois Quarry

Electrically Operated Plant at Joliet of the National Stone Company.

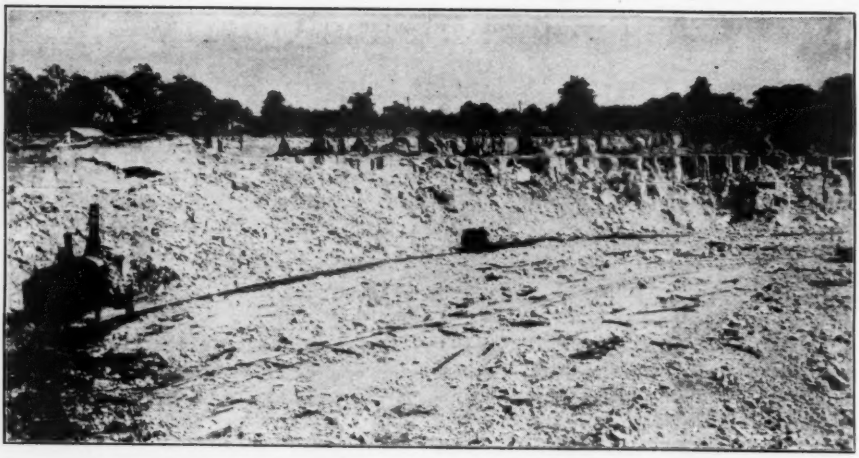
Looking Down on the Big McCully Crusher

JOLIET, Illinois, is built on a solid foundation of dolomite limestone extending for miles around, and many interesting quarry operations have been going on in its immediate vicinity for many years. Notable among the quarries of this section today is that of the National Stone Company, located about a mile south of the city on a spur of the Chicago and Alton Railroad, and an excellent photographic view of this is presented at the top of the two following pages. The National quarry has been in operation for fifteen years, and during the past five years over a million yards of crushed stone have been taken out at the present level. The daily output now is from 1,200 to 1,500 cubic yards.

The excavation at present is in the form of a round level basin over 1,000 feet in diameter, the face of the stone rising to a height of 55 or more feet all around. Very little stripping has heretofore been required, and that has been done by one of the two steam shovels in constant use—a Bucyrus and a Marion, provided, respectively, with 2½-yard and 2-yard American Manganese buckets, made by the American Manganese Company of Chicago Heights, Ill. To extend the circle of the present basin, however, would in some directions entail deeper stripping and also some difficulty in disposing of the strippage. It has therefore been decided, rather than further increase the area of operations, to descend 40 feet to a lower level, or to a total depth of 95 feet.

At the left of the picture on the next page is shown the Bucyrus shovel at work on the break of the latest blast made in the National quarry. This blast extended over a length of 300 feet of the 55-foot face, with a burden of 40 feet, and broke for the shovel 45,000 yards of material. The explosive used was 3,000 pounds of 60 per cent gelatine in 4x8-in. sticks and was supplied by the Grasselli Powder Company. The drilling was done by means of a Loomis Clipper drill, made by the Loomis Machine Company of Tiffin, Ohio, and a Cyclone from the Sanderson Cyclone Drill Company of Orrville, Ohio. The blast was a notable shot, exposing a perfectly clean and vertical face clear down to the quarry floor level, as could be seen from the top of the ledge directly behind the shovel.

The pit equipment, besides the machinery already mentioned, includes one American and one Davenport engine, which take the material in Worthington and Koppel cars from the steam shovels to the base of the incline, whence the cars are pulled up a double track by means of Allis-Chalmers and Power & Mining single-drum hoists to the crushing and screening plant. This incline is about 200 feet long, and the vertical height to the top of the 36-inch McCully crusher is about 75 feet. The cable used is of McComber & Whyte manufacture, Kenosha, Wisconsin. The aux-



Quarry of National Stone Company, Joliet, Ill. (I)

iliary crushing equipment comprises a No. 8 McCully, a No. 6 McCully, a No. 5 Gates and a set of 42-inch Superior rolls.

For conveying the crushed material to the screening plant and bins both R. & J. Dick and Granite belting are used. The buckets are of local manufacture, being made by James G. Heggie & Sons of Joliet. Power & Mining screens are used. The storage bins are of the gravity type, crib construction, with double loading tracks beneath. Besides the two locomotives regularly employed in the quarry an American engine is used for switching standard cars to and from these loading tracks. The company also operates a 15-ton McMyler locomotive crane, made by the McMyler Interstate Company, Bedford, O.

The entire crushing and screening plant is operated electrically, the electrical equipment comprising one 200-hp. General Electric motor, one 100-hp. Westinghouse, one 40-hp. Westinghouse, one 30-hp. Westinghouse, two 25-hp. General Electric, one 11-hp. Westinghouse, one 10-hp. Westinghouse, one 10-hp. Allis-Chalmers, one 7½-hp. Westinghouse and two 5-hp. Westinghouse.

The National Stone Company is ranked as one of the most progressive business concerns of Joliet. It is owned and officered by men who are always on the job. W. N. Carter, the president, is in direct charge of the production, and Stuart Gardiner, secretary and treasurer, of the distribution.

Waste.

"EXTRAVAGANCE costs blood, the blood of heroes," says Lloyd-George.

War savers are life savers. The sinews of war are gathered largely from thrift. The war perhaps can be won partly by stored-up resources. We must save out of the present products of labor. The British people had to learn, as we must learn, that goods and services must be saved by all. Saving must become a habit. For war is a battle of resources. Germany saves with efficiency because she saves scientifically. She conserves her resources.

To waste in these times is to fight on the side of the Kaiser.

Quarry of National Stone Company, Joliet, Ill. (II)

Better News From Washington

ACCORDING to a telegram from Hon. L. W. Page, chairman of the U. S. Highways Council, Washington, to Highway Commissioner Cowen of Ohio, material men and contractors will not need permits to ship material for streets and roads or for contracts and construction now under way and in force. Such material may be shipped without permit up to November 1. "No new contracts for maintenance, construction or reconstruction of streets, pavements, and highways," he says, "should be entered into, or no new construction not now in progress undertaken either prior or subsequent to November 1, without first obtaining a permit from U. S. Highway Council through State Highway Department." This means that those furnishing material on roads after November 1 must have permits to ship. These permits must be obtained through the state highway departments.

At the White House

On September 17, a most important meeting was held in Washington by the Highway Transport Committee of the National Council of Defense, and the committee later called at the White House and had a half hour conference with President Wilson on the highway program and policy for war and after war periods. This meeting may be the most far-reaching and beneficial to the road-building industries yet held. Practically all departments of the government, reports Secretary A. P. Sandles, of the National Crushed Stone Association, agreed that transportation was one of the nation's greatest needs and that highway transportation was the corner-stone. No doubt the above order, removing some of the restrictions, is a direct result of this conference. Hon. Roy D. Chapin is chairman of the Highway Transport Committee and deserves applause for his efforts from every "good roadster" in the United States.

The War Service Committee

The War Service Committee on Mineral Aggregates met in Washington on September 25. For the present the industries represented have been placed in class 4 of essentials, which will insure about 20 per cent of needs being supplied. A full report of the meting will be printed in Pit and Quarry for November.

ESTIMATED OPERATING COST OF SERVICE TRUCKS

Model 275—Three and One-Half Ton Special
Based on Operating 300 Days Per Year.

FIXED CHARGES PER DAY:

Depreciation, $3,600, less price of tires (figured separately) (per day)	$1.58
Interest on investment, $3,600, at 6% per day	.70
Insurance covering fire, theft and liability	.36
Garage at $18 per month	.60
Driver's salary	3.00
Total fixed charges, per day	$6.24

FIXED CHARGES PER MILE:

Gasoline, 5.5 miles per gallon, at 20c	$.036
Oil, 180 miles per gallon, at 50c.	.0028
Tires, based on retail price, 7,000 miles guarantee	.0394
Maintenance and overhauling (per mile)	.018
Total fixed charges, per mile.	$.0962

TOTAL COST PER DAY FOR VARIOUS MILEAGES

Daily Mileage	30 mi.	40 mi.	50 mi.	60 mi.	70 mi.	80 mi.	90 mi.	100 mi.
Daily Charges	$6.24	$ 6.24	$ 6.24	$ 6.24	$ 6.24	$ 6.24	$ 6.24	$ 6.24
Mileage Charges	2.89	3.85	4.81	5.77	6.73	7.70	8.66	9.62
Total Cost	9.13	10.09	11.05	12.01	12.97	13.94	14.90	15.86

The above costs will vary with conditions. Gasoline sells at such a wide range of prices throughout the country that 20 cents has been taken as an arbitrary price. Furthermore, users of truck fleets can buy gasoline and oil at wholesale prices; therefore, it is hard to arrive at any definite cost basis that will apply in every case.

Rock Dust Prevents Mine Fires.

Rock dust (pulverized shale) is coming into general use for preventing explosions from spreading through coal mines. These explosions are the result of the mixture of gas and coal dust. These so-called rock dust barriers, based on devices tested in France, have been designed by Geo. S. Rice, chief mining engineer of the Bureau of Mines, and tested at the experimental mine. Models of each of several types were developed, which in a large number of tests effectively stopped the propagation of explosions.

One of the most easily constructed and effective of these barriers is known as the trough barrier. It consists of six or more troughs extending across the entry at intervals of about six feet with the bottom boards held in position by a lever system connected by wires to suspension vanes 100 feet on either side of the troughs. Should an explosion occur the vanes are caused to swing, thus releasing the bottom boards of the trough so that the dust contents fall to the ground in a dense cloud, which cools the gases to such a degree as to prevent propagation of flame beyond.

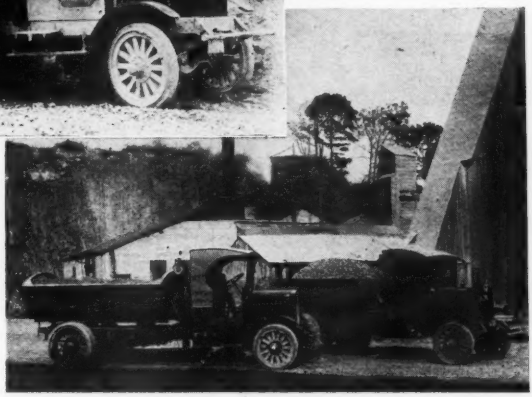
Limestone dust is also used. It is blown into the air current by means of a blowing machine and settles down on ledges and surfaces on top of the coal dust that has accumulated, which is thus kept from becoming explosive.

When

Absolute knowledge have I none,
But my aunt's washwoman's sister's son
Heard a policeman on his beat
Say to a laborer on the street,
That he had a letter just last week,
Written in the finest Greek,
From a Chinese coolie in Timbuctoo,
Who said that the niggers in Cuba knew
Of a colored man in a Texas town,
Who got it straight from a circus clown,
That a man in Klondike heard the news
From a gang of South American Jews
About somebody in Borneo,
Who heard a man who claimed to know
Of a swell society female fake,
Whose mother-in-law will undertake
To prove that her husband's sister's niece
Has stated in a printed piece
That she has a son, who has a friend,
Who
knows
when
the
war
is
going
to
end.

—Bulletin Highways Industries Association.

Five-Ton Truck Can Be Used with Either Dump or Stake Body.



The Vandermade Quarries Use Two Five-Ton Trucks with Four-Yard Steel Bodies.

Big Loads at Little Cost

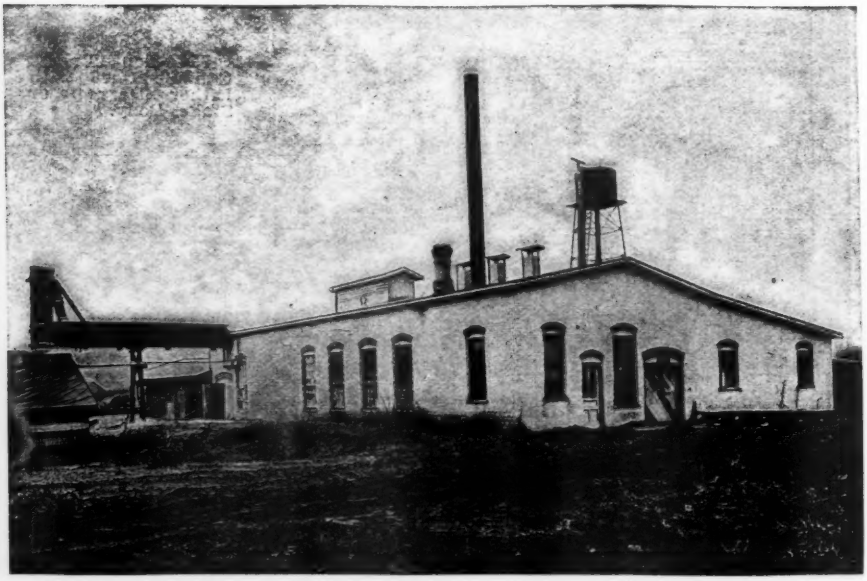
(Note Table on the Preceding Page)

PRODUCERS of material are finding an increasing use for heavy duty motor trucks, as well as for the three and one-half tonner, which is in such general use. In the pictures above, the top illustration shows a five-ton chassis with a four-yard convertible stake and dump body. The hydraulic hoist and sides can be taken from the body and stakes put in, making a regular stake body. This is a very unique arrangement and the truck can be used in various ways. It is of particular advantage during the non-operating season for firms doing general hauling during that period.

The bottom view was made at the Vandermade Quarries, formerly J. S. Sowerbutt Contracting Company, Paterson, N. J. This concern operates two five-ton dump trucks with four-yard steel bodies and have hydraulic hoists. The hoists are driven from the propeller shaft and raise the body by cross arm at the front end, the rear end of the body being on a hinge with an automatic swing gates. Both are Service trucks. The Service Truck Company also manufactures a Model 275, three and one-half ton special.

As a guide to the approximate cost of operating the smaller trucks, the cost sheet on the preceding page has been prepared.

Sand-Lime Brick*



Saginaw Brick Co.s Plant, Saginaw, Mich., Operating Seventeen Years

The main essential of a successful sand-lime brick factory, after determining a proper sand and lime supply of good quality and a market for the finished product, is machinery that will with intelligent management produce the greatest output of good brick at the lowest cost. To do so requires machinery designed for the particular work it has to do. The past fifteen years marks the existence of the sand-lime brick industry in the United States, and great improvements in methods and machinery have been made.

Local conditions enter largely into the method of handling and preparing material for the manufacture of brick from sand and lime, and additional information may be required. This article covers the method of manufacture under normal or average conditions.

SAND-LIME BRICK are an artificial sandstone, more uniform and enduring than the product of nature. They have been made since remote antiquity, but their economical manufacture remained to be worked out in comparatively recent years. In making sand-lime brick, sand and hydrated

*From information furnished by Jackson & Church Co., Saginaw, Mich.

CHARACTERISTICS OF SAND-LIME BRICK

Improve with age.
Low in porosity.
Slight heat conductivity.
Absolutely sanitary.
Practically no expansion from heat.
The bond between the mortar and brick is stronger than with clay.
Great crushing strength.
No scaling.
Unaffected by acids.
No disintegration with extreme climatic changes.
Great electrical resistance.

The natural color is a handsome grayish white. They are also made in any desirable color by the mixing of lime-proof coloring material, which in all time and under every exposure will not fade. They may also be rock-faced for variety's sake, and the effect is exceedingly artistic and beautiful.

Economy in laying on account of uniformity of size, shape and color: minimum of bats, facility with which brick can be cut.

The only brick with which a two-sided finished eight-inch wall can be built. For factories, basements, etc., they leave a white smooth surface and do not require plastering or whitewashing.

lime are mixed in the proportion of about 95 to 5 respectively, dumped into the wet pan, where they are thoroughly mulled and mixed and the coarse particles broken up, elevated to the press storage hopper and fed automatically to the press, moulded under pressure and subjected to a steam bath at 120

BELT LINE BRICK CO.'S PLANT, MINNEAPOLIS, MINN., OPERATING ELEVEN YEARS.
Installed with a capacity of 44,000, now making 100,000 brick per day. Rear view of plant, showing sand pit.

pounds pressure for a period of ten hours, when they are ready for use.

Mixing and pressing effect a mechanical union of the sand and lime, while the steam makes a chemical change in the mass, producing hydro-calcium-silicate, or sandstone, a brick suitable for every purpose for which clay brick are used and superior in many qualities. Where good sand-lime brick and good clay brick enter the same markets, sand-lime brick are invariably preferred by discriminating users and nearly always command a higher price.

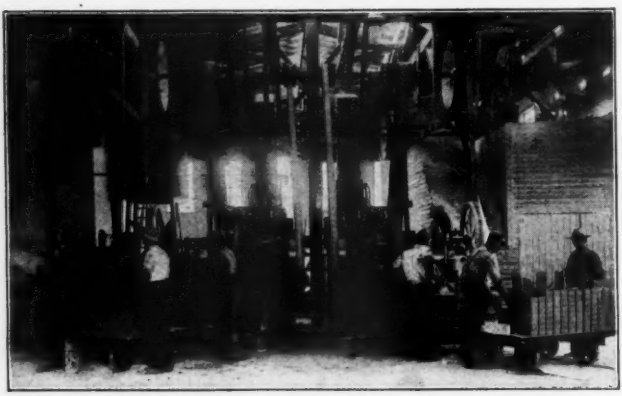
Many Kinds of Sand Used

The sand should be as nearly pure silica and the lime as nearly pure calcium as possible, but materials departing widely from these standards are often used successfully. Many are using sea sand, lake and river sand, and bank sand of varying degrees of impurity and sizes, as well as sand from crushed rock.

The building required is not elaborate, the machinery and process are simple and the labor low priced. Work can be carried on the year around and by night as well as by day.

It would not be necessary to install a lime hydrator, but it is much cheaper to hydrate your own lime, and make the profit instead of the parties selling lime, and save on freight and packages. Regarding the cost of a plant, it would be impossible to state a definite price at this time on account of the constant changes in values. Furthermore there is the difficulty of getting all the materials necessary in the building and installation of a complete plant. Estimating roughly, however, the equipment for a plant capable of making about 25,000 bricks, working ten hours a day, would cost somewhere between $25,000 and $35,000.

View of Hardening Cylinders



Presses in Operation. Left-Hand Press Making Common Brick; Right-Hand, Fancy Brick

Rotary Lime Kiln in Vermarco Lime Company's Plant

Making Marble Into Lime

The Rotary Kiln Made Possible the Solution of This Problem for the Vermarco Lime Company.

A LARGE portion of the limestone deposits of Vermont are of the highly crystalline formation that has made the Vermont marble industry what it is today, and until very recently all attempts to make this marble into lime met with failure. The difficulty was that in the vertical kilns used, the crystalline limestone or marble, breaking into granular form on the application of heat instead of keeping its shape as does ordinary limestone, choked the draft and thus stopped the burning. The rotary kiln as used in the manufacture of cement solved this problem for the Vermarco Lime Company, which has for several years most successfully used part of the waste product of the Vermont Marble Company in the manufacture of lime.

The plant of the Vermarco Lime Company is located at West Rutland, Vt. The facts and figures here presented are taken largely from an account by Harold Ladd Smith published as part of a recent report by George H. Perkins, State Geologist and professor of geology of the University of Vermont. PIT AND QUARRY is also indebted to the officers of the company for much valuable information.

The main steel building, 48x422, with two other buildings, 30x48 and 20x32, housing the gas-producer equipment and coal storage, are illustrated in the cut herewith. The construction is structural steel frame throughout on concrete foundations and covered with corrugated iron siding and roofing.

The cars loaded with blocks, spalls or any suitable class of marble waste from the quarries and mills are delivered under a crane runway equipped with a 25-ton Whiting electric crane (Whiting Foundry Equipment Co., Harvey, Ill.), and this equipment unloads the raw material and delivers it to a 48"x60" Superior jaw crusher, made by the Worthington Pump and Machinery Company. This crusher weighs 105 tons and is oper-

ated by a 150-hp. motor. The swinging jaw moves only about three or four inches, but this is sufficient to crush any block that will go into the 4x5-foot opening, at the rate of 240 tons an hour or four tons a minute. So great is the momentum gained by this huge crusher and its flywheel that it will run for about five minutes after the power is shut off.

These chunks of marble that are discharged at the bottom slide directly into a No. 6 McCully gyratory crusher, also a Worthington product. When it is found desirable to unload mill or shop waste or other material small enough to go direct to the gyratory crusher, the dump cars discharge their load to this crusher without the crane handling it or its passing through the jaw crusher. The crushed stone is then elevated and discharged by a conveyor into two stone storage bins which permit a forty-eight hour supply of raw material ahead of the kiln. The crushing equipment also includes 36x16-inch Superior and 24x12-inch Simplex crusher rolls (Worthington). The conveyors, buckets, etc., were supplied by the Stephens-Adams Manufacturing Company and the belting by the B. F. Goodrich Rubber Company.

The kiln, which measures 8 ft. in diameter and 120 ft. in length, and which resembles a huge stack on its side, was built by the Vulcan Company. It is constructed of ⅝-in. steel plates and the kiln equipment complete weighs 118 tons. The kiln is lined with firebrick and revolves on two bearings at the rate of about one revolution every three minutes, a 30-hp. variable-speed motor furnishing the power. This motor regulation enables the speed of the kiln to be adjusted to suit the conditions of burning, and the feed is operated by a rope drive on the same motor, so that any change in speed of the kiln automatically changes the rate of the feed of the crushed stone to the kiln. The heat for burning is furnished by a Chapman mechanical 10-foot gas producer.

The kiln is set at a pitch of one-half inch to the foot. It can thus be readily seen that the mass of broken marble being admitted at the upper end will gradually travel toward the lower end—it taking about four hours to pass through. Surface moisture is driven off early in the kiln, and as the stone approaches the lower end the pieces are broken down and the balance of any moisture and the carbon dioxide gas are driven off and carried with the combustion gases up the stack. The actual burning of the limestone is probably limited to the last or lower 30 feet in the kiln, known as the burning zone. A series of baffling walls in the stack chamber prevent the fine stone particles and lime from being drawn up the stack by the draft, and any of this material which collects at the base of the stack chamber is removed by a screw conveyor to the original stone elevator and deposited in the stone bins, thus being returned to the kiln.

The lime oxide or burned lime discharges at the end of the kiln through a chute directly into a cooler situated at a lower level in the cooler pit. This is a stack-like cylinder on its side similar to the kiln, but without any brick lining. It is 5 ft. in diameter and 50 ft. long. The cooler equipment weighs about 27 tons. Lifting angle irons are bolted to the inside of the cooler so that as it revolves the fine granular lime is raised and dropped through the air, and thus the cooling operation is facilitated. A draft through the cooler is induced by the kiln stack and the burning process in the kiln, and thus the air passing over the hot lime in this cooling process is preheated for the kiln. This cooler is mounted on two bearings

pitched at the same grade as the kiln and operated by a 10-hp. motor. The granular lime which entered the cooler at approximately 2,200° is discharged at the end sufficiently cooled so that it can be safely elevated to the two large steel oxide bins of approximately 250 tons capacity each. From these bins the quicklime can be loaded in bulk into cars or barreled as the trade demands. Automatic scales control both operations. In a cooperage shop connected with the plant the barrels are made in which the oxide is packed.

Plant of the Vermarco Lime Company, West Rutland, Vt.

The lime oxide may be taken from the bins by still another elevator to the six-cylinder Kritzer hydrator, made by the Kritzer Company, Chicago. This machine scientifically slakes the lime, adding the proper amount of water to exactly hydrate and yet have the product come out absolutely dry. The water is admitted in a spray to the stack of the hydrator, through which the heat generated by the chemical reaction is carried off, and this not only keeps the light hydrate from being drawn up the stack, but the water in turn is preheated, thus assisting the action of hydration. Revolving beaters or paddles assist the movement of lime and water through the series of six cylinders, thoroughly mixing the oxide with the water and insuring complete hydration and absolute drying, so that the material is discharged to a screw conveyor at the bottom as an impalpable flour. This passes to Raymond mills and beaters, where any core, unburned material or foreign substance of any kind is separated and discharged, permitting the pure white, fluffy hydrate to be raised in the air separators to the hydrate storage bins, from which it is bagged in valve paper sacks by an Urschell-Bates valve bagging machine. A dust-collecting system at the bagger removes the fine material that is spilled in bagging.

This bagger works in a unique way. The paper sacks are made with no opening except for a small hole in a fold at one end. Into this hole a tube about one inch in diameter is inserted, and through this the hydrate is forced into the bag. The flow of hydrate is automatically stopped when the bag contains 50 pounds. No sealing or tying of the bag is necessary, for the pressure of the contents seals the opening in the fold and then the bags are trucked and piled in the stock house.

The large storage space at the end of the building permits carrying a stock of both the oxide and hydrate. The ability to store from 1,500 to 2,000 tons of lime guarantees prompt deliveries and economic operation.

To the equipment above described has recently been added a pulverized-stone department which takes the crushed marble from the stone storage bins and with the aid of a Fuller mill reduces it to about 100-mesh product, suitable for agricultural limestone, as a paint and putty filler, etc., for which the demand is rapidly increasing. This product is elevated to storage bins, packed and shipped in a way similar to the lime products.

The entire plant has been so designed that its capacity may be doubled, for space has been left for the installation of another kiln, cooler and producer as soon as growth of business demands. Individual motors control each operation, the electric power being supplied from the company's hydro-electric stations. The motors are from the Westinghouse Company. The capacity of the plant as it is now equipped is about 75 tons of oxide a day or 88 tons of hydrate. The operation is continuous night and day except for enforced shutdowns for repairs.

The rotary kiln lime plant is an especially valuable addition to Vermont industries since it makes it possible to burn the Vermont crystalline marble deposit which cannot be burned in the old-style vertical kiln, thus providing a market for a part of the great waste item in the marble industry.

The product of the rotary lime kiln is granular, and therein lies the greatest difference from the lump quicklime with which everyone is familiar. Quicklime upon exposure to the air takes up chemically the moisture of the air and the carbon dioxide, resulting in a product that is partly hydrated lime and partly carbonated lime. In so combining it breaks down to granular form, and because of the large percentage of the lime that has reverted to the original limestone it is of little value to the mason. It is not strange, therefore, that the general public should draw the conclusion that a lime that is granular in form is air-slaked. Familiarity with the product, however, soon demonstrates that this is not the case. Actually because of its compact form, very similar to granulated sugar, the Vermarco lime will not air-slake as readily as a lump lime, but it hydrates with greater rapidity than lump lime, for the water has immediate access to each particle.

Production of Potash.

The statistics of the production of potash for the first six months of 1918 received by the United States Geological Survey, Department of the Interior, to date show a total output of 20,000 to 25,000 short tons of pure potash (K_2O), indicating that the output for the entire year may reach 50,000 to 60,000 tons. As only 32,573 tons was produced in 1917 the production is evidently increasing rapidly. The domestic production now equals 20 to 25 per cent of the normal domestic consumption before the war, which is estimated to have been about 240,000 tons. The statistics for the first half of the year are not complete, for returns have not yet been received from a few large producers, and it is possible that the production in 1918 may exceed 60,000 tons, for reports made to the Survey indicate that a number of new enterprises may be put into operation during the second half of the year.

I FIND in PIT AND QUARRY more live information regarding our quarrying and contracting business than I do in magazines for which I am paying $3.00 and $4.00 per year.—A. Vandermade, owner of the Sowerbutt Quarries, Paterson, N. J.

PIT AND QUARRY is greatly appreciated. We find it full of valuable information.—Foster & Creighton Company, Russellville, Ala.

ASSOCIATION ACTIVITIES

E. GUY SUTTON
Secretary of the War Service Committee

Join Your Association.

Hereafter the crushed stone and sand and gravel industries in their relations to the Government will be represented by their War Service Committee, known officially as the Committee on Mineral Aggregates of the War Industries Board. The industries are being mobilized. Every producer will want to do his part. Every producer should become a part of his national organization. Coöperation has already done wonders—the work must go on.

If you haven't joined, ask for particulars. Here are the organizations:

The National Crushed Stone Association, A. P. Sandles, Sec'y, 405 Hartman Bldg., Columbus, O.

The National Association of Sand and Gravel Producers, E. Guy Sutton, Sec'y, Majestic Building, Indianapolis, Ind.

The National Agricultural Limestone Association, 406 Hartman Building, Columbus, O.

National Slag Association, H. J. Love, Sec'y, Leader-News Building, Cleveland.

Agricultural Limestone Association.

WHAT organization can do for an industry was never better illustrated than in the case of agricultural limestone. At the present time only about one-third of all the limestone producers of the United States are enrolled in the National Agricultural Limestone Association. The beneficial results already achieved by this organization through education and legislation have been notable and of inestimable value not only to the industry it represents but to the farmers of the country and to the nation as well. In a future issue PIT AND QUARRY will print some account of the great work done by this aggressive and progressive body under the able direction of its executive officer, Secretary G. J. Wilder.

The War Service Committee.

PIT AND QUARRY printed last month a full list of the members of the War Service Committee on Mineral Aggregates. The addresses of all were not then, however, available. They are as follows:

1. B. D. Pierce, Connecticut Quarries Co., New Haven.
2. James G. Shaw, 26 Cortlandt street, New York City.
3. George D. Van Sciver, The De Frain Sand Co., Philadelphia.
4. J. H. Rodgers, Rodgers Sand Co., Pittsburgh.
5. Joseph J. Hock, Arundel Sand and Gravel Co., Baltimore.
6. W. F. Shaffner, North Carolina Granite Corp., Winston-Salem, N. C.
7. W. S. Holmes, Chickamauga Quarry and Construction Co., Chattanooga, Tenn.
8. A. P. Burke, Atlanta Sand and Supply Co., Atlanta, Ga.
9. Walter D. Jahncke, Fritz Jahncke Co., New Orleans.
10. P. M. Lewis, American Sand and Gravel Co., 907 Chamber of Commerce Building, Chicago.
11. G. A. France, France Stone Co., Toledo.
12. George V. Miller, Granite Sand and Gravel Co., Indianapolis.

13. John Prince, Stewart Sand Co., Kansas City, Mo.
14. A. J. Blair, Lake Shore Stone Co., Milwaukee, Wis.
15. C. S. Lambie, Platte River Sand and Gravel Co., Denver.

James G. Shaw, of New York, is the chairman, and E. Guy Sutton, of Indianapolis, is the secretary. Permanent offices will be established in Washington. For the present Secretary Sutton may be addressed at Indianapolis, 609 Majestic Building.

Michigan Gravel Men Organize.

AT A meeting held September 3 in the rooms of the Old Colony Club, Detroit, the Michigan Sand and Gravel Producers' Association was formally launched. Representatives of the following concerns were present, all of whom joined the new organization, those not already members also making application at the same time for membership in the National Association:

Genesee Gravel Co., Detroit.
A. E. Sheltraw, Saginaw.
Hersey Gravel Co., Evart.
United Fuel & Supply Co., Detroit.
Otisville Gravel Co., Flint.
Huron Shore Gravel Co., Saginaw.
Marquette Gravel Co., Marquette
Valley City Stone and Gravel Co., Grand Rapids.
Detroit-Greenville Gravel Co., Brighton.
Kalamazoo-Greenville Gravel Co., Kalamazoo.
Standard Gravel Co., Pontiac.
Detroit-Oxford Gravel and Stone Co., Detroit.
Standard Builders' Supply Co., Grand Rapids.
Ohio-Michigan Sand and Gravel Co., Toledo, Ohio.
Ward Sand and Gravel Co., Pontiac.

The constitution provides for a salaried executive secretary, an initiation fee of $25 and annual due of from ½ to 2 mills per ton on commercial sand and gravel and ¼ mill on railway ballast sold within the state. Officers were elected as follows:

President—C. N. Ray, United Fuel and Supply Co., Detroit.
Vice-President—W. O. Smith, Detroit-Oxford Gravel and Stone Co., Detroit.
Secretary-Treasurer — John S. Porter, Huron Shore Gravel Co., Saginaw.
Executive Committee—Guy C. Baker, Detroit-Greenville Gravel Co., Kalamazoo-Greenville Gravel Co., Greenville, Ohio; N. P. Belnap, Cement Products Co., Greenville, Mich.; W. F. Bradley, Ohio-Michigan Sand and Gravel Co., Toledo, Ohio; G. A. Glerum, Hersey Gravel Co., Hersey, Mich.

Mr. Porter, who was a prime mover in bringing about the organization, acted as temporary chairman of the meeting, which was characterized throughout by a progressive spirit of enlightened coöperation. The first speaker was Harry Donnelly, of Cincinnati, president of the National Association, and he was ably seconded by Guy C. Baker, of Greenville, O., secretary of the Ohio Association and deputy member of the War Service Committee. H. S. Earle, of Michigan, known throughout the state as a staunch good roads advocate, also gave an encouraging talk.

Important Indiana Meeting.

THE County Commissioners' Association of Indiana will hold its annual convention at Logansport October 15, 16 and 17. This is one of the most important events of the year, as nearly all the county officials of the State attend, and all public work is thoroughly discussed, especially road building. The officials of the association are: Ulysses S. Hauck, president, Logansport; A. H. Pollentzke, vice-president, Valparaiso; A. F. Rothstein, secretary, Logansport; George A. Raub, treasurer, Logansport. F. W. Connell, of Indianapolis, is chairman of the legislative committee.

Organization Notes.

Secretary F. W. Connell of the Indiana Crushed Stone Association, is doing splendid work in impressing upon county officials the importance of maintaining roads and is also doing effective propaganda work along these lines by mailing some convincing literature to influential taxpayers.

For the Ohio Sand and Gravel Producers' Association Secretary Guy C. Baker reports that rush of business, keeping up with car distribution and priority orders has prevented anything but formal meetings.

The Iowa Sand and Gravel Producers' Association has of late successfully concentrated its attention on increasing its membership, and now includes 95 per cent of the state's producers. No independent steps, says Secretary W. R. Webster, have been taken regarding war conditions, but the association's activities have been along the line of working with the National Association.

To Establish Washington Office.

IN order to give the most efficient service to sand and gravel producers, regardless of whether they are members of the association or not, Secretary E. Guy Sutton of the National Association of Sand and Gravel Producers, announces that the organization is establishing its office in the national capital. He has already begun the sending out of monthly bulletins, the first of which is dated September. It contains in authentic form much valuable information and should be in the hands of every producer.

Truck Owners' Conference.

THE feature of the first day's sessions of the Fifth National Truck Owners' Conference at Detroit on September 19 and 20 was the address delivered by Lt. Col. Barrett Andrews, U. S. A. He gave his audience a staggering array of facts concerning the magnitude of the work already accomplished along transport lines in France. The number of vehicles used by our first American Field Army he stated as follows: 40,000 trucks, 7,900 passenger cars, 24,250 motorcycles and 6,500 ambulances. These vehicles alone require the entire attention of 154,000 men. In other words, 10 per cent of our force is used in truck transportation work. The two lessons, said Col. Andrews, that have been learned about truck transportation under war conditions are the necessity for simplification and standardization. The great value of the truck was never better shown than at Verdun. Had it not been for this vehicle in quantities of thousands used for transport of men and munitions, the pivotal city would have early fallen to the Huns. As an example of the gigantic use of ammunition he pointed out that munitions which had taken 28 days to transfer to the front line guns had been shot away in three days and two nights. In closing he said that the war will have developed hundreds of thousands of trained and disciplined truck drivers who will materially enrich this country's skilled labor after the war, and he made a plea for the more mature and experienced truck men of America to enter the truck transport service abroad.

The moving pictures taken under the personal direction of Harold P. Gould, chairman of the Conference, gave the truck owners a vivid example of the every-day truck transport problems and showed in detail how these problems are successfully solved by expert traffic men in every phase of present-day truck transportation.

Enthusiasm on the part of those in attendance at the Conference over its success marked the closing meeting of the second day's session at the Board of Commerce auditorium, Detroit, on Friday, September 20. Hundreds of truck owners and operators, both large and small, from all parts of the Middle West, attended. Addresses illustrated by graphic motion pictures featured both afternoon and evening sessions. Each address was delivered by a well-known traffic expert most experienced in his particular field of truck activity.

Our Proud Purse.

GERMANY'S war debt has reached 37 per cent of its total wealth, that is to say, 37 per cent of $80,000,000,000. We have spent only 5 per cent of our national wealth of $250,000,000,000. We look over these figures with a sense of proper pride as we approach the fourth Liberty loan. We are made conscious of having only scratched the surface of our wealth. Wherefore we should prepare to take liberally of the issue with the pleasurable knowledge that with the $6,000,000,000 subscribed we will not even yet have approached the expenditures of enemy countries. Our wheels are just starting to turn with the magnificence of our purposes, and to give them momentum let us make wide estimates of what we will do with our shares individually. We have made a good national start. Let us hit harder each time.—*Chicago Tribune.*

MEN AND MACHINERY

Titan Truck and Atlas Loader at Work

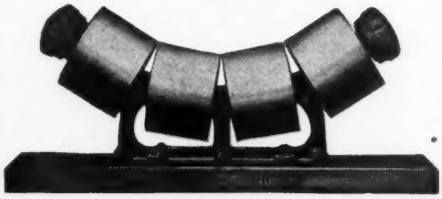
Hoisting and Haulage.

At this time, when growing scarcity of labor makes imperative the careful inventory of mechanical equipment, a study of the catalog of the J. S. Mundy Hoisting Engine Company (Neward, N. J.) is well worth the time of every quarryman and every sand and gravel operator. The Mundy business was established in 1870, and the Mundy was the pioneer friction-drum hoisting engine. It is known the world over and has kept pace fully with the rapid progress of the past half century. The company's present catalog affords material for a thorough and systematic analysis of every requirement in the way of hoisting and mechanical haulage devices—hoisting and haulage engines, erecting, logging and dredging engines, derricks, buckets, dippers, blocks, etc. Valuable suggestions without number will be found, too, in the many special engines, derricks, portable boilers and other devices, which are all fully illustrated. The book solves many difficult problems and it is to be had for the asking.

1 Truck=8 Teams.

The Nichols Sand and Gravel Co., Wauwatosa, Wis., are the owners of the Titan truck shown in the accompanying illustration. Ed H. Nichols, secretary of the company, writes that it makes 8 to 10 trips daily, hauling sand in 5-yard loads an average distance of 9 miles and thus making about 80 miles per day. The truck, he says, does the work of eight teams, and the total cost of hauling this sand per yard by motor is 37 cents, as against $1.12 by teams. The loader is backed into the sand bank, as illustrated, and the truck is backed underneath the spout, which is screened for removing the dirt from the sand. The grade on the driveway leading from the pit is 13

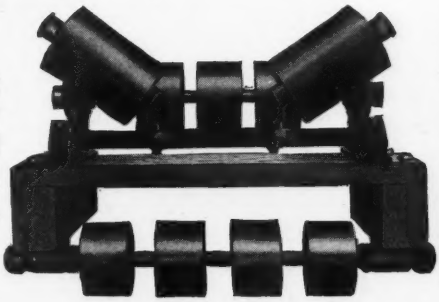
CALDWELL CONVEYORS

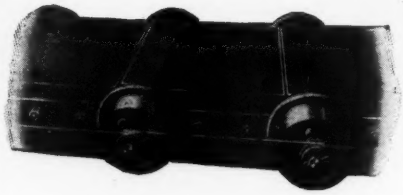


BELT CONVEYORS

Simple in design, economical of power, they give satisfaction. Different styles to suit your requirements.

A rough sketch showing conditions to be met at your plant, with capacity desired and power available, will bring our recommendations.





APRON OR PAN CONVEYORS

Flights or pans made of steel or cast iron, fitted to steel bushed self-oiling roller chain — complete with drives.

SCREW CONVEYORS

Steel "HELICOID" or Sectional flight screw conveyor for washing plants. We also make cast iron Screw Conveyors.

See Catalogue No. 38 for complete line of

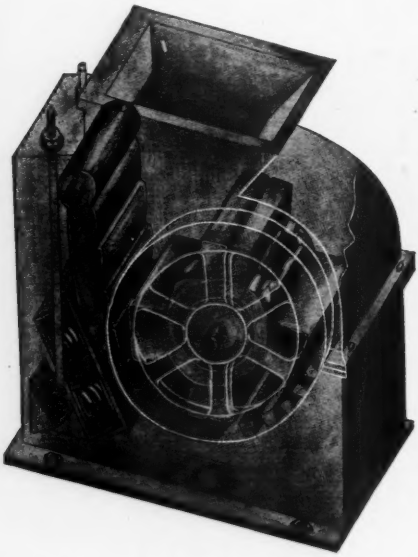
Elevating, Conveying and Power Transmitting Machinery

H. W. CALDWELL & SON COMPANY
CHICAGO
Western Avenue, 17th and 18th Streets

degrees, and this the loaded truck easily negotiates. The Titan is manufactured by the Titan Truck Co., Milwaukee. The loader used is the make of the Atlas Engineering Co., also of Milwaukee.

Lubricating Wire Rope.

Various methods have been employed of applying lubricant to wire rope, but in adopting any one method or combination of methods the particular mode chosen must be dictated by the specific problem encountered. On inclined and horizontal ropes, says "Lubrication," where operating speeds permit, operators often pour the lubricant on the rope, the excess being caught in a pail, which serves the double purpose of container and overflow vessel. It has been found good practice to paint the lubricant on with a brush, catching the surplus, as before, in a pail. Good results have been obtained by providing each rope with a trough through which the rope is compelled to pass by making it run under a wheel mounted on the trough. Another device consists of a barrel fitted with steam coils, to insure a proper heating of the product, and a valve and short piping arrangement for furnishing a continuous flow of the lubricant to the rope, suitable means being provided for wiping the cable and conserving the excess dressing. Engineers report good service obtained by pouring the dressing on the winding drums. Others say they have obtained best results by providing each rope with a split box of some 25 lb. capacity into which compounds can be poured while hot and through which the rope passes in operation.



Williams Patent Cushioned-Hammer Crusher and Pulverizer

Crusher and Pulverizer.

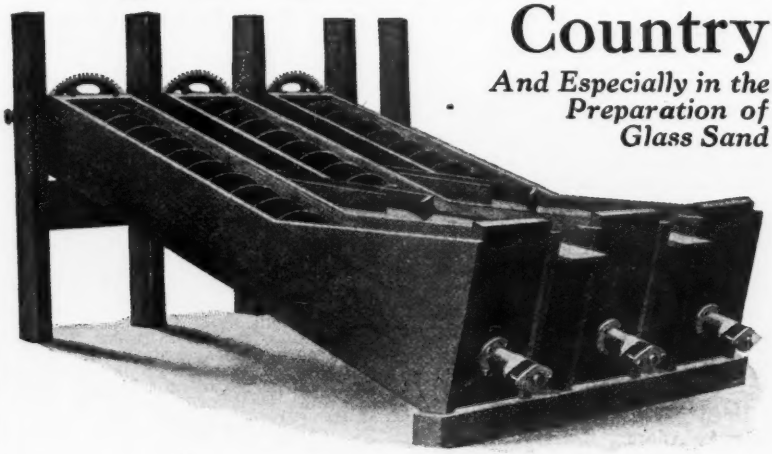
A machine which, it is claimed, will break 4-inch niggerheads or gravel to ¼-inch and under in one operation is illustrated herewith—the cushioned-hammer crusher and pulverizer combined, manufactured by the Williams Patent Crusher and Pulverizer Co., St. Louis. It is made in three sizes, with portable openings 5x10, 8x16 and 10x24 in., and weighing, respectively, 2,000, 4,500 and 6,500 pounds. The hammers, which are compressed with springs and rubber into pockets, weigh, in the smallest size, 50 lb. each and have a tensile strength of blow of more than 6,000 lb. The jaws are cushioned at the back with a sliding box of springs whose tensile strength is equal to 6,000 lb., so that an object going into this machine is struck with a 50-lb. blow at 400 r. p. m. The hammer, forced back momentarily, is thus propelled with a force equaling a 6,000-lb. blow, which breaks the object into particles. The grate is removable. There are only two bearings, for which grease cups are provided.

Blasters' Handbook.

A pocket text-book called "The Blasters' Handbook" has just been issued by E. I. du Pont de Nemours & Company of Wilmington, Delaware, which tells in detail how to blow soot from big chimneys, how to break up old boilers and heavy machinery and how to use explosives for every purpose where their employment is practicable. This book gives valuable information regarding the proper explosive to use, the quantity, the method of loading and firing. It is profusely illustrated and contains charts and dia-

Used in Some of the Largest Quarries in the Country

And Especially in the Preparation of Glass Sand



LEWISTOWN

Sand Washers

These are reasonably priced, well built, compact outfits, which can be easily and quickly installed. They are simple in construction and efficient in operation. Extensively used in the manufacture of glass sand which is so much needed today in the making of optical lenses for field glasses, telescopes, etc., required by the Government.

If you are not acquainted with Lewistown equipment and service, it will pay you to look into it.

We are in position to assist you solve your problem of whatever nature, if it pertains to crushing, grinding, screening, washing, drying and conveying, as we manufacture a full line of this machinery and equipment. Drop us a line stating what you desire information on.

Lewistown Fdy. & Machine Co.

LEWISTOWN, PENN.

grams that make the work a valuable addition to any technical library. Readers of PIT AND QUARRY may have this book free of cost by addressing a card to the Du Pont Company, Wilmington, Del.

Demand for Manganese.

The war is creating, among other needs, an unusual call for manganese, and the Government is encouraging in every way the production of this metal and especially the development of all fields in which the ore may be profitably mined. Such a field is reported to exist in the Batesville district of Northern Arkansas and a number of Chicago parties are investigating its possibilities. If the encouraging reports already at hand are verified, no time will be lost in beginning operations, which will require extensive equipment in the way of steam shovels, washers, drag lines and other machinery.

Personal Mention.

Lewis A. Adams, until recently assistant superintendent of the Ohio Quarries Co., Amherst, O., is now with the colors in France, serving with Company C of the Twentieth Regiment of Engineers, known as the Quarrymen's Regiment. At his special request PIT AND QUARRY is following him into the field of action.

Frederick W. Smith, superintendent of the National Stone Co.'s quarry at Joliet, could not resist the call of his country and left September 6 for the training camp with sixty of Joliet's selected men. The departure of the boys was the occasion of a big patriotic demonstration, and the many individual farewells voiced to "Fred" as the train pulled out testified to the quarryman's popularity among his associates and townsmen.

A. C. McKibbin, who has served as secretary of the Missouri State Highway Board since its organization in March, 1917, retired as secretary on September 20, retaining, however, his position as a member of the board. In withdrawing from active secretarial work, Mr. McKibbin states that he will devote practically all his time to the development of the Highways Transport Committee of the Missouri Council of Defense, and to the Capital Highways Association, which is working for improvement of a system of roads radiating from Jefferson City, the state capital.

Payne G. West has been appointed assistant manager of field sales for the Lakewood Engineering Co., Cleveland. Mr. West is thoroughly familiar with all branches of the machinery field. A graduate of Carroll College, 1901, he later studied civil engineering for two years at the University of Wisconsin, and for the past twelve years he was associated with the T. L. Smith Co., of Milwaukee.

Road Building Must Continue

THERE are many substantial reasons that the war should accelerate rather than retard road construction. The cost of getting farm products to market should be lessened, and this can only be accomplished by improvement of the roads. Freight congestion on railways could be relieved to a great extent if roads could be constructed or repaired sufficiently to admit of motor trucks being used for comparatively short distance hauls. Such freight deliveries to distances of 100 miles are common where the roads are good. The cost in most instances is slightly higher than by the railways, but the deliveries have been made promptly. There is one most difficult problem in the construction of roads at this time, however, and that is labor. During the sessions of the Southern Commercial Congress, in New York last month, Dr. Clarence J. Owens suggested that the thousands of Germans now being supported in internment camps should earn their living. For years the convicts of several of the states have done this kind of work, notably in Georgia, Virginia and Colorado. It has been found necessary since the beginning of the war to guard the important traffic lines and important munition and commissary depots, and it would not be difficult, with these same military forces, to guard these interned men; thus the interned aliens would be the means of building or improving many miles of highways.—*Indianapolis News.*

Trade Literature.

BULLETIN D-702 of the Worthington Pump and Machinery Corporation gives clearly every detail of construction of the famous Deane of Holyoke Vertical Triplex Power Pumps. Every design and pattern, both single- and double-acting, is illustrated, as well as the various parts as used in assembling the company's standard pumps of this type for average operating conditions. Every present or prospective user of pumping machinery will find this bulletin of permanent educational and reference value.

THE Gandy Belting Company's August pamphlets include one giving some handy reference rules for finding belt speed per minute, horsepower for given speed, width and thickness, etc., also simple directions for lacing.

BULLETIN 34-K of the Chicago Pneumatic Tool Company is devoted to their new line of fuel oil driven compressors (class N-SO), featuring totally enclosed construction and efficient automatic lubrication and regulation. The company guarantees these compressors to compress air to 100 lb. pressure at a cost not exceeding 54 cents per 9-hour day for each 100 cubic feet per minute of free displacement.

We showed you how one quarry owner doubled his output—How another saved 15c a yard in loading.

Now Note How a Third User of

The HAISS Digging WAGON LOADER

Combines Screening and Loading

Photograph shows our Wagon Loader, receiving avalanched material and taking up same by means of the buckets on the elevator, which in turn discharge over a double deck "shaker" screen. The sand falls directly into cart from screening pan, the gravel running over the side of the wagons as shown.

This illustrates clearly how screened material may be obtained directly from the sand bank by means of a Haiss Digging Wagon Loader.

Write for booklet "Q" describing these outfits.

The George Haiss Mfg. Co., Inc.

142nd Street and Rider Avenue **NEW YORK**

Continuous, Automatic Accurate Weighing

is accomplished with

THE POIDOMETER

Handles quantities from 1½ to 21,000 pounds per minute of an unlimited number of materials. Indispensable to lime and cement plants.

Proportioning of materials is correct and automatic. The weight on the middle roller actuates the scale beam and controls the gate opening, so that the exact amount of material is liberated to maintain a uniform weight on the roller. Easy to install. Feeds from bin, elevator or conveyor. Cannot clog in hopper. Bearings dustproof. Liquid measure attachment gives a mixture of any desired consistency.

The POIDOMETER is explained in detail in Bulletin No. 5. Send for a copy.

The Schaffer Engineering and Equipment Co. Tiffin, Ohio

USED EQUIPMENT BARGAINS

Steam Shovels

Special attention is called to the following thoroughly overhauled shovels. Good as new.

1—Marion 91, 4-yard dipper.

LOCOMOTIVES

3—18-ton, 10x16″ Dinkeys, 36″ gauge
2—15-ton, 9x14″ Dinkeys, 36″ gauge
2—10-ton, 7x12″ Dinkeys, 36″ gauge
1—20-ton, 11x16″ Dinkey, 36″ gauge.

DUMP CARS

75—4-yard Western, steel beam, 36″ gauge
30—4-yard Western, wood beam, 36″ gauge
4—4-yard K. J., wood beam, 36″ gauge
13—4-yard Oliver, wood beam, 36″ gauge

PUMPS

2—Swaby No. 8 Centrifugal, 10″ suction, 8″ discharge
2—Emerson No. 3, 4″ suction, 3″ discharge
2—Emerson Jr.
3—Fairbanks-Morse 6-4-6 Duplex, 3″ suction, 2″ discharge
1—Fairbanks-Morse No. 5 Centrifugal
1—Fairbanks-Morse Centrifugal, 10″ suction, 8″ discharge
3—Fairbanks-Morse 7-4½-7 Duplex, 4″ suction, 3″ discharge

All equipment we offer is thoroughly repaired before shipment.

H. Kleinhans Company

Union Arcade **PITTSBURGH, PA.**

USED EQUIPMENT BARGAINS

MARSH'S
Quarry Specialties
GUARANTEED

CRUSHERS

1—No. 2 Gates Style D
1—No. 3 Gates Style D
1—No. 4 Gates Style K
2—No. 5 Austin
1—No. 5 Gates Style D
1—No. 6 Gates Style D
1—No. 6 Gates Style K Complete plant
1—No. 7½ Austin Complete plant
1—No. 8 Gates Style K
1—No. 9 Gates Style K
2—No. 12 Gates Style K
2—15x24 Traylor Jaw Crushers
1—20x24 Traylor Jaw Crushers
1—10x20 Blake Jaw Crushers

ELEVATORS

1—No. 5 Gates 60′ Centers
1—No. 6 Gates 60′ Centers
1—No. 7½ Austin 60′ Centers
1—No. 9 McCully 60′ Centers

SCREENS

2—32x 9 Austin
1—40x14 Gates
1—48x18 Austin
1—60x20 Gates

RAIL

1,000 tons 45-lb. Relayer
300 tons 35-lb. Relayer
10,000 feet 24″ gage Koppel Track

BOILERS

1—25 H. P. Vertical
1—50 H. P. Vertical Ohio
1—40 H. P. Firebox on trucks
1—80 H. P. Firebox on skid
2—300 H. P. Water Tube

ENGINES

1—22x42 R. H. Vilter Corless with condenser and pump
1—14x22 Vilter Corless
1—60 H. P. Erie
1—80 H. P. Buckeye
1—125 H. P. Buckeye
2—200 H. P. Hamilton Corless
1—500 H. P. Vilter Corless and others

COMPRESSORS

1—Imperial XB2, Ingersoll Rand, capacity 2,400′, belt driven
1—Laidlow Dunn Gordon, 2 stage, capacity 600′, belt driven
1—Bury, 2 stage, capacity 400′, belt driven
1—Sullivan, 2 stage, 1,800′, steam driven
1—Ingersoll Rand, 2 stage, 1,000′, steam driven
2—Bury Duplex 500′ capacity each

CARS

30—2½ yd. Steel Austin end dump
15—2½ yd. Gates Austin end dump
20—1½ yd. Western side dump, 36″ gauge
30—4 yd. Western side dump, 36″ gauge
20—12 yd. Western side dump, standard gauge
50—1¼ yd. Koppel side dump, 24″ gauge
100—60,000 Capacity Gondolas and Flats, standard gauge

LOCOMOTIVES

1— 9x14 Baldwin, 36″ gauge
1—10x16 Vulcan, 36″ gauge
1—10x16 American, 36″ gauge
2—11x16 Vulcan standard, 36″ gauge
2—12x18 Vulcan standard, 36″ gauge
2—19x24, 45 ton, 6 wheel switchers
2—19x24 10 wheelers, and others

DRILLS

1—Loomis Well Drill
1—Cyclone Well Drill
1—Star Well Drill
1—Keystone Well Drill
8—3½ Sullivan Tripod Drills

SHOVELS

1—No. 0 Thew Traction, ⅝ yd.
1—No. 0 Thew Standard gauge, ⅝ yd.
1—No. 1 Thew Traction, 1 yd.
1—No. 2 Thew Standard gauge, 1½ yd.
1—Model 41 Marion, 1½ yd.
1—Model 61 Marion, 2½ yd.
1—70C Bucyrus, 2½ yd.
1—95C Bucyrus, 3½ yd.
1—36 Marion Traction, 1½ yd.

We Own or Control All of the Above and Guarantee Every Item to Be Exactly as Represented

Write, Wire or Telephone at Our Expense

Machinery Warehouse & Sales Company

Successors to

GEORGE C. MARSH & CO.

Contractors' & Railway Equipment

Telephone Harrison 6904

General Offices

744 Old Colony Building, CHICAGO

CRUSHING PLANTS
STEAM SHOVELS
LOCOMOTIVE CRANES
LOCOMOTIVES
QUARRY CARS
ELEVATORS
SCREENS
STEEL DUMP CARS
CLAM SHELL BUCKETS

HOISTING ENGINES
AIR COMPRESSORS
TRENCH MACHINES
DRAG LINE EXCAVATORS
STEAM ROLLERS
CABLEWAYS
CONCRETE MIXERS
BOILERS
ENGINES

NO. 8 GATES BALL MILL FOR SALE

This Ball Mill has never been used. Complete with feeder, charge of balls and driving pulley. Price $4,500.00 for immediate sale.

Apply Pit & Quarry, Box No.10

TWO LIME KILNS CHEAP

We have for sale the steel and iron work for two new vertical Lime Kilns, never been used. They are 37 feet high and 11 feet in diam., lower half 5/16 in. thick, upper half 3/16 in. thick. Can furnish drawings to interested party. This is a bargain.

BLOWERS LIME & PHOSPHATE CO.
OCALA, FLA.

Limestone Plant FOR SALE

We offer for sale a well-equipped plant, making agriculture Lime, Crushed Rock, and Mineral Filler for Asphalt Paving, with a good farm and equipment in connection. Have good reason for selling. This is a splendid opportunity to get a good paying business at pre-war price.

Address Limestone, care Pit & Quarry.

CRUSHER FOR SALE

Two 18x24" Blake type, jaw crushers. Manganese jaw plates. Chicago delivery.

One 12x18" Farrell jaw crusher on steel trucks. Chicago delivery.

One No. 12 Gates gyratory, style K.

One No. 5 Austin gyratory in strictly good working order, with extra parts, and 50-foot elevator.

Set three conical screens.

Address

National Surface Guard Co.
343 So. Dearborn St. Chicago

FOR SALE

1 Sauerman Electric Power Scraper.
90 H.P. A.C. motor, 220 volts, 3 phase, 60 cycles.
⅞ Cable, 1 yard scraper, all necessary blocks. Used only 6 months.
1 Peerless Crane.
13 Feet Track Gauge, 8¼x10 Lidgerwood Engine, Ohio Boiler.
Dake Swinger, 40-foot Boom, ¾-yard Aden Bucket. All necessary cables, ready to operate.

Both outfits are in A No. 1 condition and can be seen in operation at present time.
Will take in exchange for one of these outfits 10-in. Morris Direct Driven Sand Pump with 250 H.P. A.C. Motor, 440 volts, 3 Chase 60 cycles, 500-600 R.P.M., resistance coils and drum controls.

BROADWAY SAND, GRAVEL & ARTSTONE CO.
Stop 5, Bedford, Ohio, Cleveland Suburb

FOR SALE

Sand and gravel plant complete, 37 acres of land and railroad connection. Steam slackline outfit, capacity 8 cars per day. Adjacent good Illinois markets. War conditions force owner to sell at one-third original cost. Only $4,000.00 cash required. Bargain for quick buyer.

Address "Sandman"
in care of Pit & Quarry
Rand-McNally Bldg.
Chicago, Ill.

Immediate Shipment

9 pieces 5/8" Roebling Traction steel cable, 300' length. 10c per foot. Good used condition.

1 complete motor driven crushing plant, 150 tons capacity per hour.

20 crushers Nos. 2-12.

Boiler and Electric Equipment

Ross Power Equipment Co.
Merchants Bank Bldg.
Indianapolis Indiana

WANTED

You to know that I am not going to specify kind of position wanted, but briefly state experience, after which you can better determine if I am the man you are looking for. Qualified for Superintendent or Manager.

Skilled in handling labor.
Skilled in blasting.
Skilled in heavy or light repairs of machinery.
Skilled in systematizing an organization to procure results on an economical basis.
Skilled in all details pertaining to the quarry business and experienced in marketing the product.
Middle age, married.
At your service August 1st. References on application.

Address H., care Pit & Quarry.

Our recent sales have been of
Boilers, Cranes, Derricks
ETC.
Why not write us?
The Curtiss-Willis Co.
INCORPORATED
30 CHURCH ST. NEW YORK
Mechanical Equipment
Wire Rope
"We Find Things"

Dump Cars
of all kinds and sizes
Portable Track, Rails, Frogs, Switches, Steel Ties, Complete Railways, Bucket Excavators, Dump Buckets
Economical Transportation Means
KOPPEL
Good Stocks
Prompt Shipments
Write for our catalog
PLANT-KOPPEL, PA.
OARENSTEIN-ARTHUR KOPPEL CO.
T. H. Given, Manager for Alien Property Custodian under appointment dated June 15, 1918.
SALES OFFICES:
NEW YORK CHICAGO PITTSBURGH
PACIFIC COAST REPRESENTATIVE:
KOPPEL SALES CO., INC. SAN FRANCISCO

FIRST—Get Bulletin 237—or, wire
ZELNICKER IN ST. LOUIS
BEFORE BUYING OR SELLING
RAILS
LOCOMOTIVES—CARS—CRANES
SHOVELS—MACHINERY—PILING, ETC.
What Have You For Sale?

Correct Belting for Economy's Sake

Scientifically constructed belts, made of the very best materials the market affords, reduce belting troubles and tonnage costs to a minimum.

There are five good reasons why we offer Conveyor, Elevator or Transmission belting that will give satisfaction.

1. They run true, being of uniform construction.
2. The stretch is reduced to the absolute safe limit.
3. The duck is strong, firm and densely woven, making it extremely flexible in operation.
4. The rubber compound is of an unusually tough nature, resistant to cutting action and wear.
5. They carry maximum load.

We suggest the following brands and our Engineering Department would be glad to aid in the solution of any belting problems:

FOR CONVEYORS
Giant, Relio or Supremo Brands
FOR ELEVATORS
Silvertown or Fortune Brands
FOR TRANSMISSION
Matchless, Rainbow, Four Ace or Giant Brands

United States Rubber Company

Mechanical Goods Division

New York

"It Hasn't Given One Minute's Trouble"

That's what Mr. Monteith says about the

BELL OIL-BURNING LOCOMOTIVE

He is superintendent of the world's largest underground limestone quarry—that of the Low Moor Iron Co., of Low Moor, Virginia.

He knows machinery, for he's handled much of it. His Bell Locomotive has earned this praise because it withstands severe usage and costs little to operate.

Let us tell you the rest of the story

BELL LOCOMOTIVE WORKS, INC.
80 Church St. NEW YORK, N. Y.

Union Steel Rivetless Chains

"The Chain of Double Life"
Fits Cut and Std. C. I. Sprockets
1 to 12 in. pitch.

High Carbon Links (STRENGTH) Large Glass—Hard, Reversible Bearings (DURABILITY), One-Piece Rivetless Construction (PERMANENCY) insure Trouble-Proof Money Saving Service. Bushing Chains, Roller Chains, Attachment Links, Buckets, Sprockets, Elevators, Conveyors, etc.

THE UNION CHAIN & MFG. CO. Seville, Ohio.

Patents Secured to Protect Inventions

Royal E. Burnham
Patent Attorney

Real Estate Trust Bldg., Washington, D. C.

TRADE MARKS

Registered in United States Patent Office

PERFORATED METALS and SCREENS OF ALL KINDS

MATERIAL IN STOCK
PROMPT SHIPMENT

Chicago Perforating Co
2445 West 24th Place
Tel. Canal 1469 CHICAGO, ILL.

The Shortest Route From Pit to Plant Is Taken By the

Sauerman Dragline Cableway Excavator

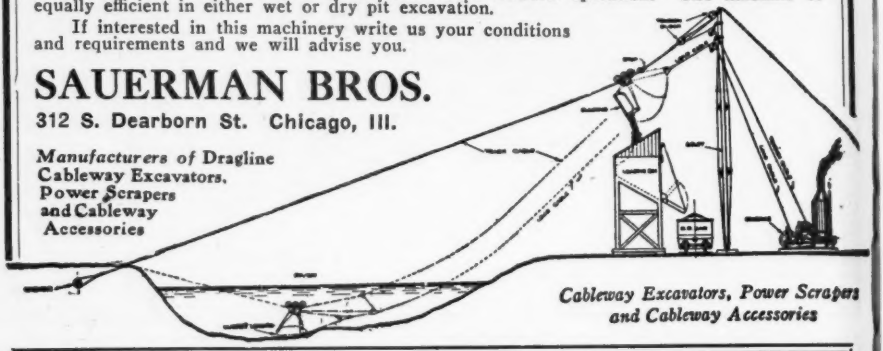
Sand and gravel producers employing this excavator are using the minimum amount of labor and machinery because one man operating a double drum friction hoist digs, conveys, elevates and dumps in one continuous forward operation. The machine is equally efficient in either wet or dry pit excavation.

If interested in this machinery write us your conditions and requirements and we will advise you.

SAUERMAN BROS.

312 S. Dearborn St. Chicago, Ill.

Manufacturers of Dragline Cableway Excavators, Power Scrapers and Cableway Accessories



Cableway Excavators, Power Scrapers and Cableway Accessories

SAND AND GRAVEL PRODUCERS

INVESTIGATE the exclusive patented features which make the Pioneer system the most efficient and economical method of digging and conveying sand and gravel. Saves labor, time, and power.

Pioneer Outfits Represent Lowest Plant Cost

THE MANSFIELD ENGINEERING CO. **Indianapolis, Ind.**

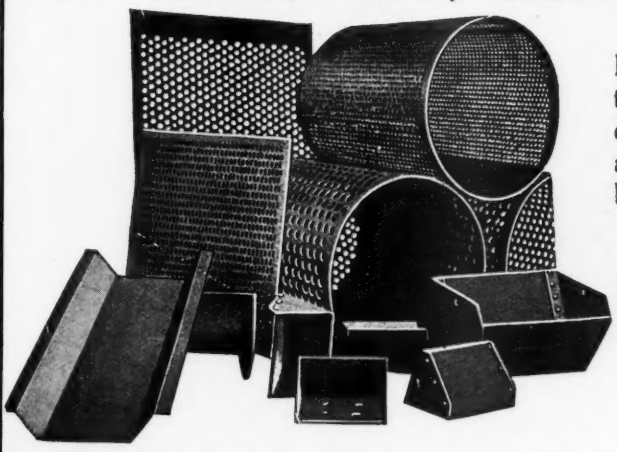
AUSTIN GYRATORY CRUSHERS

Absolutely Dust-Proof Bearings—Automatic Oiling System—Rigid Eccentric Bearing—Uniform Receiving Opening Regardless of Size of Product—Every part proportioned to stand maximum strains—Countershaft supported upon each side of Driving Pinion—Made in Eight sizes, from 50 to 5000 tons per day.

Everything in Earth-Handling, Rock-Crushing and Road-Building Machinery. Send for Descriptive Catalogs.

AUSTIN MANUFACTURING COMPANY, CHICAGO
New York Office, 50 Church Street

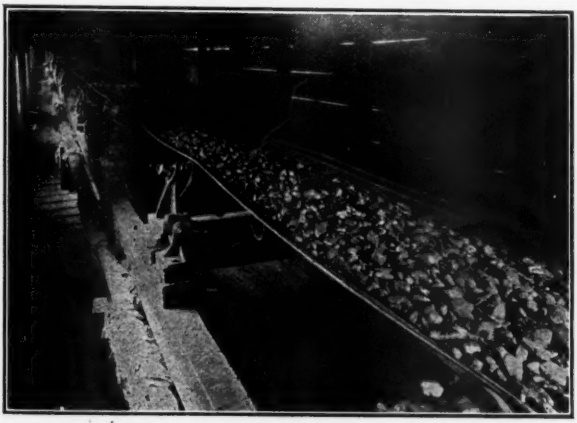
Perforated Metal Screens
FOR STONE, SAND, GRAVEL, ETC.



Plates flat; rolled to diameter or radius for revolving and conical screens butted or lap joints

Elevator Buckets
in all styles and sizes

HENDRICK MFG. CO., 39 Dundaff Street CARBONDALE, PA.



For Driving and Conveying
"V-B"-Belt
White Seal Belt
Ampere Canvas Belt

Write

Victor-Balata & Textile Belting Co.

Manufacturers of { "V-B" (Victor Balata) Belt
"WHITE SEAL" "AMPERE" and
"SPECIAL" Grade Canvas Stitched Belting

Main Sales Office: 38 Murray Street, NEW YORK, N. Y.

BOSTON 27 High Street
CINCINNATI 212 E. 2nd St.
CHICAGO 167 N. Market St.
FACTORY Easton, Pa.

Built Especially for Stone Quarries

No. S. Y. 12

SUPERIOR STONE GRAPPLE

Has a grip that a seven-ton stone cannot loosen. Yet its powerful manganese steel calked fingers quickly pick up or release rocks weighing from a few hundred to fifteen thousand pounds, at the will of the operator.

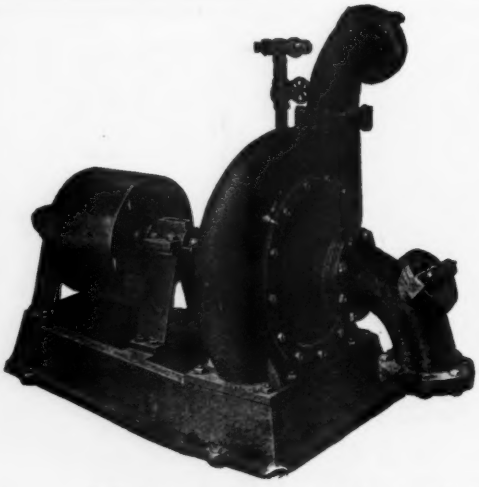
Simple in design and has few parts, so that finger tips, joint pins and bushings can be replaced at small expense when necessary.

Type S. X. 5, having five forged fingers with tool steel points, is designed for handling rocks of 15 tons and upward, used in building breakwaters and similar work.

Built by

Superior Iron Works Co.

SUPERIOR, WIS.



For handling sand, gravel, and other solids in suspension at a minimum cost, use

Erie Sand-Gravel Dredging Pumps

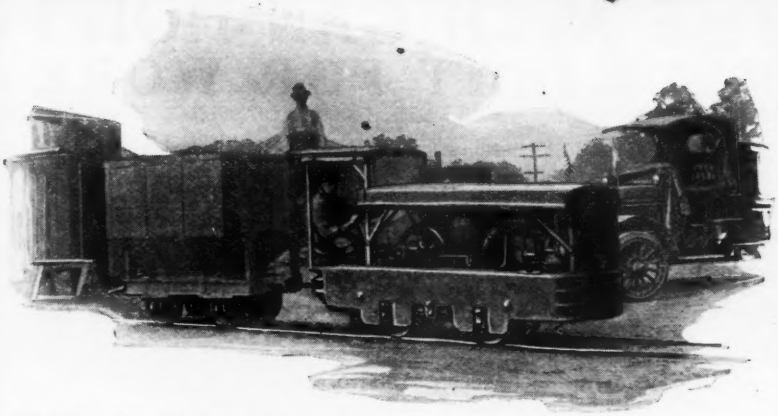
Small sizes as well as largest ones are designed to give maximum output and greatest wear for a given weight.

Tell us your conditions, giving total vertical lift with length of pipe line, and ask for Bulletin P-33

ERIE PUMP AND ENGINE WORKS

Formerly of ERIE, PA.

MEDINA, N. Y.



With the PLYMOUTH— Six Men to the Good!

THAT'S the way the Commonwealth Quarry Co., Springfield, N. J., figure it since putting a PLYMOUTH Gasoline Locomotive into service. All told, the Commonwealth and its allied Companies have bought six PLYMOUTHS.

They have given it the job of hauling stone from the crusher for loading trucks or freight cars:—they report that,

With a Two-Man Crew, the PLYMOUTH is Doing What Eight Formerly Did By Hand

Best of all, the owners gladly state that the Locomotive has stood right up to the work without making trouble of any kind.

Several hundred users in every part of the country will gladly testify to the helpful service of PLYMOUTH Gasoline Locomotives. Some are probably located near you; write us for their names, then go and see the outfits in use.

Getting "PLYMOUTH-Wise" Will Help Your Business. Ask Us for the Facts.

Without obligating you in the least, we'll gladly send particulars about PLYMOUTH Gasoline Locomotives and their part in putting through many of America's big industrial programs.

It's an interesting story—with a big lesson for every executive who has his ear to the ground these days.

Why not write us today?

THE J. D. FATE COMPANY

206 Riggs Avenue **PLYMOUTH, OHIO**

Sales Representatives in all Principal Districts

19-PQ

THE MICHIGAN HOIST IS A GIANT FOR WORK

It is a time and money saver in heavy dock work and stationary hoisting of all kinds. Occupies only five square feet of floor space.

Operated with one lever and is instantly reversible. Equipped with a friction for fast lowering if desired.

Built for long service and hard wear. The two cylinders have well-fitted, easy-running pistons and all connecting rods and crank are made of the best steel obtainable.

All bearings heavily babbitted—driving gears are perfectly fitted and lined up so as to run smoothly, properly shielded by guards.

The two winch spools are 10 inches long—the drum is 14 by 26½.

We can make prompt shipment if we receive your order soon.

READY FOR IMMEDIATE SHIPMENT

Yours for Hoisting Service

Michigan Dredge Co.

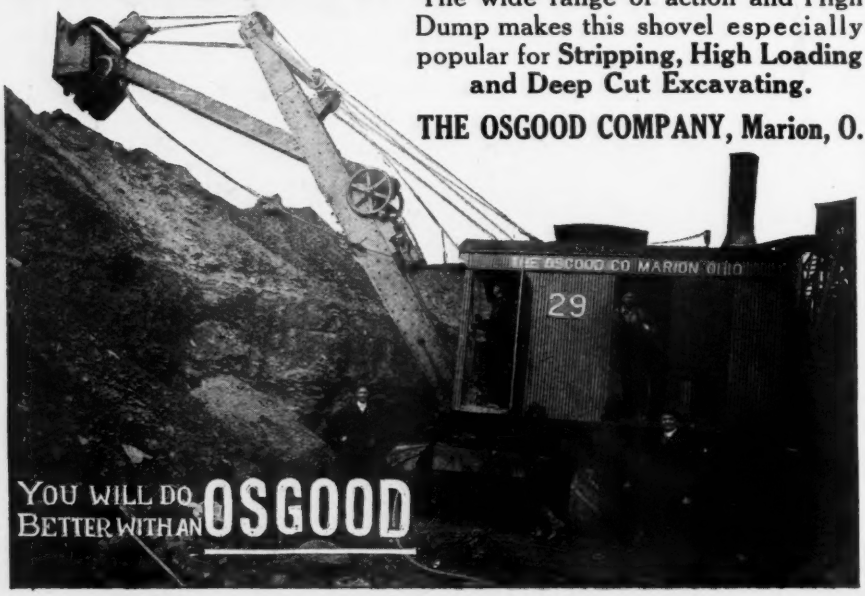
Bay City, Mich.

OSGOOD "29"

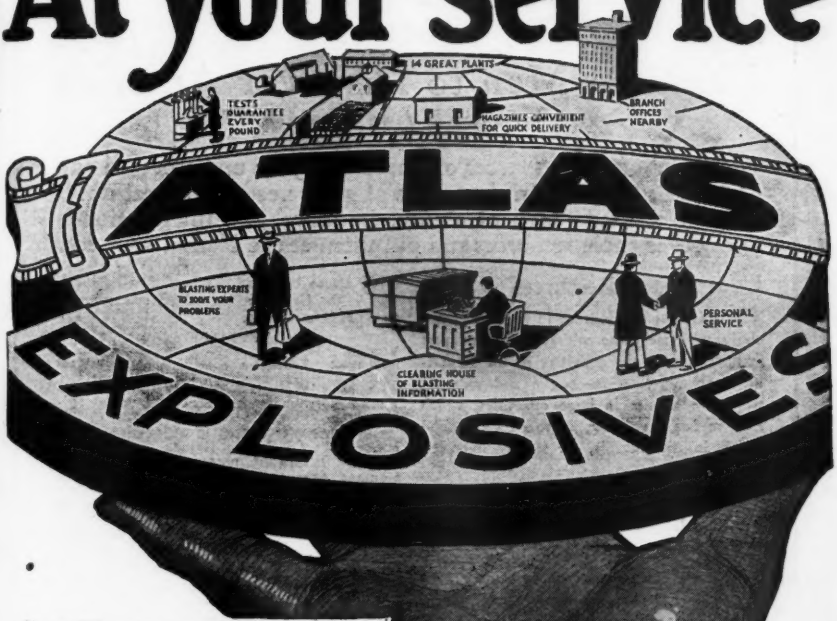
1-Yard Traction Revolving Steam Shovel

The wide range of action and High Dump makes this shovel especially popular for **Stripping, High Loading and Deep Cut Excavating.**

THE OSGOOD COMPANY, Marion, O.



At your service



"AT your service" might be considered the ATLAS slogan. It expresses the spirit which permeates every department, yes every man, in our nation-wide organization.

We have the benefit of more than a century's experience in making explosives. Through our service department, which is the mouth-piece for expressing the co-operation of our entire organization, all of this century's experience is at the disposal of *any man* who has blasting to do.

We are confident that if you will but utilize this personal ATLAS service—

First: Your blasting will be done better.
Second: Your blasting will be done more economically.
Third: You will be glad you put your blasting problems up to us.

ATLAS POWDER COMPANY

Home Office, Wilmington, Del.

SALES OFFICES: Allentown (Pa.), Birmingham (Ala.), Boston, Chicago, Houghton (Mich.), Joplin (Mo.), Kansas City, Knoxville, McAlester (Okla.), Nashville, New Orleans, New York, Philadelphia, Pittsburg (Kan.), Pittsburgh (Pa.), Pottsville (Pa.), St. Louis, Wilkes-Barre (Pa.).

A PROPER EXPLOSIVE FOR EVERY BLASTING REQUIREMENT

Put Your Blasting Problems Up to Us

Our Service Department is a clearing house of blasting experience in all its phases and under all conditions. It is directed by experts who will personally help you apply this vast store of information to your *own blasting*. WRITE TODAY.

Wanted:—Men to Discover America

A Statement by Franklin K. Lane, Secretary of the Interior

MANY of the resources of our country lie undiscovered and undeveloped. In these days of great needs and great deeds men are wanted—men of ability, initiative, and imagination—to discover these resources and put them at the Nation's service.

Undeveloped Resources

The undeveloped resources to which I particularly refer are those with which I am most familiar through the activities of the Department of the Interior—metals and minerals which we require in large quantities, which exist in large quantities in this country, and which, in spite of this, are largely imported from abroad.

What They Are

We must have chrome, manganese, and pyrite. Our chrome comes mostly from South Africa and New Caledonia; our manganese from Brazil; our pyrites from Spain. To produce some two million tons of these and other imported minerals from domestic sources will release from three to four hundred thousand tons of shipping for military use.

Where They Are

Will you save Ships for the transporting and feeding of our armies by discovering and developing our own deposits of these minerals?

They are to be found in the following localities in the United States, which are tributary to a possible market.

PYRITES

Virginia		Minnesota
New York	Tennessee	South Dakota
Georgia	Pennsylvania	Colorado
Alabama	South Carolina	Illinois
Wisconsin	New England States	Indiana
Missouri	—	Ohio

MANGANIFEROUS IRON ORE

Minnesota Colorado Nevada New Mexico

MANGANESE ORE

Montana Arizona Utah Wyoming New Mexico Washington Virginia Idaho Nevada California Oklahoma Tennessee Georgia Oregon Arkansas

CHROME ORE

California Georgia Wyoming Maryland Oregon Pennsylvania North Carolina

One man in Georgia last year developed five pyrites mines without a cent of subsidy from the Government: and he was a manufacturer, not a miner. Many others can do likewise if they will.

We are discovering that many minerals we need we have in the United States. But we have hardly begun to develop these minor resources. Let us get at it in earnest.

Secretary of the Interior.

The Hercules Powder Co. welcomes the opportunity to put before you this statement by Secretary Lane. The latent resources of our country to which he refers fall within the field of a great national industry—the mining of metals and minerals—with which we are very closely allied. A large part of the explosives which we make are used by the miners of the country—men to whose initial energy the United States owes vital factors in the present crisis, its ships, its motors, its tanks, its cannon; in fact all its implements of active warfare.

HERCULES POWDER CO.

Chicago Hazleton, Pa. Memphis Pittsburg, Kan. Salt Lake City St. Louis
Denver Joplin New York Pittsburgh, Pa. San Francisco Wilmington, Del.

DU PONT AMERICAN INDUSTRIES

Dont Waste Explosives!

Tamp each charge thoroughly to confine the full force of the blast and use the explosive particularly designed for your kind of blasting operation.

One means of conserving is to use Red Cross Explosives. Another economy is to

Fire Charges Electrically

There is no reason for using dynamite of 40% or 60% strength when the same or better results can be accomplished with a grade of less strength.

And electric firing with dependable Du Pont blasting machines and electric blasting caps, is surer and safer.

Our High Explosive Booklet and our Blasting Supplies Catalog will advise what will best serve you. Free copies on request.

E. I. du Pont de Nemours & Co.

Power Makers since 1802 **Wilmington, Del.**

THE DU PONT AMERICAN INDUSTRIES ARE:

E. I. du Pont de Nemours & Co., Wilmington, Del., Explosives.
Du Pont Chemical Works, New York, Pyroxylin and Coal Tar Chemicals.
Du Pont Fabrikoid Co., Wilmington, Del., Leather Substitutes.
The Arlington Works, 725 Broadway, New York, Ivory By-ralin and Cleanable Collars.
Harrison Works, Philadelphia, Pa., Paints, Pigments, Acids and Chemicals.
Du Pont Dye Works, Wilmington, Del., Coal Tar Dyestuffs.

Note: When in Atlantic City visit Du Pont Products Store, Boardwalk and Pennsylvania Ave., and the Shooting School on ocean end of Young's Million Dollar Pier.

DU PONT

THAT LIBERTY SHALL NOT PERISH FROM THE EARTH BUY LIBERTY BONDS

FOURTH LIBERTY LOAN